

JPRS 71926

25 September 1978

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS
ELECTRONICS AND ELECTRICAL ENGINEERING
No. 42

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

20000503 054

U. S. JOINT PUBLICATIONS RESEARCH SERVICE

Reproduced From
Best Available Copy

U S S R

EAST
EUROPE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22151. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ELECTRONICS AND ELECTRICAL ENGINEERING

No. 42

This serial publication contains abstracts of articles and news items from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

Photoreproduction of foreign-language sources may be obtained from the Photoduplication Service, Library of Congress, Washington, D. C. 20540. Requests should provide adequate identification both as to the source and the individual article(s) desired.

CONTENTS	PAGE
ELECTRONICS	
Amplifiers	1
Antennas	4
Certain Aspects of Computer Hard and Soft Ware; Control, Automation, Telemechanics and Machine Planning	7
Certain Aspects of Television and Photography	17
Communications, Networks, Data Transmission and Processing	18
Components and Circuit Elements Including Waveguides and Cavity Resonators	57
Converters, Inverters, Transducers	67
Cryogenics and Superconductivity	69
Electroacoustics	70
Electromagnetic Wave Propagation; Ionosphere, Troposphere, Electrodynamics	72
Instruments and Measuring Devices and Testers: Methods of Measuring	74
Microelectronics, Integrated and Logic Circuits; General Circuit Theory and Information	86
Oscillators, Generators, Modulators	91
Quantum Electronics, Lasers, Masers, Holography, Quasi-Optical	93

CONTENTS (Continued)

Page

Radars; Radio and Other Navigation Aides	98
Receivers and Transmitters	105
Semiconductors; Dielectrics; Luminescence; Solid State; Films	106
Theoretical Aspects	111

ELECTRICAL ENGINEERING

Electrical Engineering Equipment And Machinery	113
Electron Tubes; Electrovacuum Technology	118
General Production Technology	120
Power Systems	125

USSR

UDC 621.375

THE F7073 AND F7074 SERIES OF HIGH-SPEED DC MEASUREMENT AMPLIFIERS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1978 p 34

KAVOKIN, V. P., candidate in technical sciences, KRASNOSHCHIEKOV, YE. M., engineer and POLONSKIY, A. M., engineer

[Abstract] Technical data are given on the F7073, F7074 series of high-speed amplifiers developed at the All-Union Scientific Research Institute of Electronic Measuring Instruments in Leningrad. The distinguishing features of these amplifiers include high metrological indices on direct current, good dynamic characteristics and high interference immunity. These are single-range instruments consisting of two main subassemblies: a pre-amplifier and a galvanic isolation unit with output amplifier. The circuitry is modular and consists of IC's and FET's. Measurement ranges are from 1 to 1000 mV, speed is 10^{-3} - 10^{-5} s, error with consideration of zero drift is 0.05-1 percent, input impedance is 10^7 ohms, coefficient of interference suppression exceeds 80, working temperature range 0-50°C, supply voltage 200 VAC 50 Hz (within 1 Hz). The output voltage of the F7073 is ± 10 V for a load impedance of more than 2 k Ω , and the output current of the F7074 is ± 5 mA for a load impedance in the range of 0-2.5 k Ω . The amplifiers are produced by the Vitebsk Electronic Measuring Instrument Plant. Figures 1.

USSR; POLISH PEOPLE'S REPUBLIC

UDC 621.375.1

INCREASING THE EFFICIENCY OF HIGH POWER, HIGH-FREQUENCY AMPLIFIERS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 103-105
manuscript received 27 Oct 76

EBERT, YA. and KAZIMERCHUK, M., Institute of Radioelectronics, Warsaw Polytechnical Institute

[Abstract] A new approach to increasing the efficiency of a high power, high-frequency amplifier is based on the theoretical and experimental study of two amplifiers: 1) A classical amplifier with a parallel resonant circuit; and 2) A "dual" amplifier with a series resonant circuit. A sinusoidal current flows in the output of the amplifying element in the "dual" amplifier with a pulsed voltage applied. The efficiency is increased by modifying the device so that the current changes which correspond to the voltage changes in the "dual" parallel-tuned circuit approximate the waveform of that obtained in the amplifier with the parallel resonant circuit. An amplifier was constructed with a selective network having properties intermediate between those of

parallel- and series-tuned circuits. The experimental check of this transistor amplifier yielded a power efficiency of 95 percent. The collector circuit depends on the ratio of the working frequency to the cutoff frequency of the transistor. The power efficiency is plotted as a function of this ratio for an amplifier with a classical resonant circuit and the amplifier with the modified "dual" circuit. The improved efficiency design is distinguished by its simplicity, ease of amplifier tuning and good harmonic suppression with low value of the circuit Q. In the high-frequency range, the output reactance of the active element can be so low that it is impossible to achieve a sufficiently small value of the ratio of the equivalent resistance to the capacitive reactance, and thus attain the intermediate type of tuned circuit properties. Figures 5; references 17: 11 Polish, 3 Russian, 3 Western.

USSR

UDC 621.375.4.029.64.001.5

EFFECT OF NONIDEALNESS OF A CIRCULATOR ON THE AMPLITUDE CHARACTERISTICS OF REGENERATIVE AMPLIFIERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 862-864 manuscript received 2 Aug 76

TEKSHEV, V. B.

[Abstract] A system of equations is derived which defines the characteristics of reflecting regenerative amplifiers in the large signal range with nonidealness of the circulator taken into consideration. The equations are written in parametric form using the signal voltage or amplitude (U or I) as the parameter. The relations obtained for several sets of circulator parameters are used to calculate the characteristics of a tunnel diode amplifier with low-signal transmission coefficient and various matching circuits. References 6 (Russian).

USSR

UDC 621.391.2

EFFECT OF THE DEGREE OF NOISE CORRELATION IN REFLECTING DEGENERATE PARAMETRIC AMPLIFIERS AND THEIR STAGE CONNECTIONS ON THE SENSITIVITY OF RADIOMETERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 860-862 manuscript received 3 Nov 75; after revision 18 Apr 77

EMKIN, V. S.

[Abstract] Expressions are derived for the amplification coefficients of a degenerate parametric amplifier, individually with respect to the signal and no-load frequencies (with resonance), in order to study the effect of the degree of the noise correlation in reflecting degenerate parametric amplifiers and their stage connections on the sensitivity of radiometers. The reflection and transmission parameters are tabulated for a two-stage degenerate parametric amplifier without phasing, and the formulas are compared for amplifiers with and without phasing. Tables 1; references 3 (Russian).

USSR

UDC 621.396.628

RESULTS OF INVESTIGATION OF 7-METER ANTENNA OF RADIO TELESCOPE BY PHASOMETRIC METHOD

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 5, 78 pp 631-637 manuscript received 16 Nov 76; after completion 20 Jul 77

DMITRENKO, D. A., TURCHIN, V. I., POGEL', A. L., DMITRENKO, L. V., IGNAT'YEV, V. I., PASMANIK, L. A., SAVEL'YEV, A. N. and SYSOYEV, YU. V., Scientific-Research Radio Physics Institute

[Abstract] A method is available for determining the radiation pattern (RP) of an antenna by the angular pattern distribution of its near field at a section of the spherical surface in the Fresnel Zone. The present work presents the results of determination by the indicated method of the RP of two 7-meter antennas. Problems of the practical realization and possible sources of error of the method are examined. The antennas studied were axisymmetric two-mirror systems of the Cassegrainian type (diameter of primary mirror, 7.0 m; diameter of secondary mirror, 1.05 m; focal length, 2.5 m) with horn-type lens irradiation. The antennas were mounted on a completely rotatable device with an electric drive which made it possible to measure the distribution of the near field at the spherical surface, using an immovable radiator. The radiator (horn with an aperture on the order of 2λ) was installed on a tower approximately 25 m high at distances $R = 100$ m, and $R = 52$ m from the antennas investigated. The authors thank N. M. Tseytlin for constant attention to the work. Figures 12; tables 2; references 14: 13 Russian, 1 Western.

USSR

UDC 621.396.677.833.1

CURRENTS AND PATTERNS OF A PARABOLIC REFLECTOR WITH AN EXCITER OF THE HUYGENS ELEMENT TYPE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 23 No 4, Apr 1978 pp 673-681 manuscript received 28 Sep 77

FEL'D, YA. N. and ANSRYAN, A. K.

[Abstract] A study is made of a reflector antenna, the surface of which is part of a paraboloid of rotation with an ideally conducting, infinitely thin surface. It is assumed that the antenna is excited by crossed electric and magnetic dipoles. The relations derived express the current density distribution on the reflector and the field excited by it in terms of two series, the first of which converges on the average with some weight, and the second, uniformly. The current density distribution curves and radiation patterns for the reflector were calculated on a computer for a variety of parameters.

These curves are plotted on graphs which indicate that the series for the patterns converge appreciably better point by point than the series for the current, just as in the scalar case. Figures 4; tables 1; references 3 (Russian).

USSR

UDC 621.396.677.494.71

ANTENNA ARRAYS FOR THE MILLIMETER FIELD BAND

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 240 No 6, 21 Jun 78 pp 1340-1343 manuscript received 22 Mar 78

ANDRENKO, S. D., DEVIATKOV, N. D., academician, and SHESTOPALOV, V. P., Institute of Radio Physics and Electronics, Academy of Sciences UkrSSR, Khar'kov

[Abstract] A method is described for synthesizing antenna arrays for the millimeter band based on converting surface waves to volumetric waves. Antenna arrays based on this effect contain a source of nonhomogeneous (surface) waves with an associated periodic structure. The surface waves can be produced by any slow-wave waveguide structure, and the surface-to-volumetric wave converter can be any periodic structure. As the surface wave propagates along the waveguide, it excites the elements of the periodic structure in sequence with a phase shift determined by the lattice period and the relative phase velocity of the surface wave transmission line. The radiation pattern of the proposed system can be shaped by proper selection of the geometry of the scattering periodic structure. Figures 4; references 4 (Russian).

USSR

UDC 621.396.677.833.1.001.57

EXCITATION OF A PLANAR-EQUIANGULAR-SPIRAL ANTENNA BY A SYSTEM OF δ -OSCILLATORS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 682-689 manuscript received 19 Jul 76

GOROSHCHENYA, A. B.

[Abstract] A method is derived for determining the constant coefficients used to describe the excitation of a plane-equiangular-spiral antenna with terms in the form of the natural waves of the structure where the excitation is realized by a ring of δ -oscillators, the dimensions of the ring are appreciably less than the wavelength, and the emf along the ring varies according to the exponential law $\exp(in\phi)$. The method is based on comparing the electrodynamic and electrostatic fields of the investigated structure near the center of the spiral plane, which permits the previously undefined coefficients to be found. All of the known experimental facts of the theory of equiangular-spiral antennas such as the existence of the noncharacteristic radiation modes, the distortion of the polarization characteristics and the appearance of side lobes for angles close to $\pi/2$, and the periodic dependence of the phase radiation pattern on the logarithm of the frequency with the period $2\pi/n$, are explained by the derived expressions. These expressions may also be used to calculate the field in the far zone considering the excitation efficiency, which is of special interest for multimode excitation of the given antennas. The author thanks M. S. Bobrovnikov, V. G. Myshkin and G. G. Goshin for useful and stimulating discussions. Figures 1; references 11: 6 Russian, 5 Western.

Certain Aspects of Computer Hard and Soft Ware;
Control, Automation, Telemechanics and Machine Planning

USSR

UDC 007.5:519.173:621.382

AN ALGORITHM FOR LAYING OUT RESISTOR ROUTING IN AUTOMATED DESIGN OF MONO-LITHIC INTEGRATED CIRCUITS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 75-78
manuscript received 10 Jun 77; after revision 29 Aug 77

KLYGINA, L. A. and NOSKOV, YU. M.

[Abstract] A technique is described for planning resistor topology in bipolar integrated circuits by breaking up the initial region into non-intersecting singly connected figures and routing the resistors within these regions. An algorithm is given for plotting the paths of resistors based on the principle of dynamic programming. This algorithm solves the problem of finding a quasi-maximum chain between two vertices of a graph. An example is given of resistor routing layout by the proposed algorithm. The machine time and storage volume necessary for computerizing the algorithm are discussed. Figures 2; tables 1; references 4: 3 Russian, 1 Western.

USSR

UDC 531.74.084.2-192

CALCULATION OF THE RELIABILITY OF TESTING OF THE POSITION OF OBJECTS BY CONTACTLESS TRANSDUCERS

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 211-213
manuscript received 20 Oct 75; after completion 4 Feb 77

PANIN, ANATOLIY VLADIMIROVICH, candidate in technical sciences, chief of Sector of Voroshilovgrad Affiliate of "Giprougleautomatizatsiya" [State Planning and Design, and Scientific-Research Institute for Automation of Coal Industry]; and KIRICHENKO, OLEG FEDOROVICH, senior scientific worker, Voroshilovgrad Affiliate of "Giprougleautomatizatsiya"

[Abstract] The reliability of testing of the position of objects by contactless sensors, yielding "yes" or "no" information, is determined under the following assumptions: a "no" answer means that the object is located beyond the zone of sensitivity of the transducer; the status of the object is evaluated on the basis of a single, instantaneous measurement. A "false alarm" error is ignored in this case. An equation is derived for determination of the reliability of testing of the position of objects, and is tested in a physical experiment. Figures 2; tables 1; references 2 (Russian).

USSR

UDC 62-50

OPTIMIZATION OF SYSTEMS FOR AUTOMATIC REGULATION WITH RANDOM PARAMETERS

Novocherkassk, IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 128-132 manuscript received 23 Oct 75

KAVERIN, ADOL'F IVANOVICH, candidate in technical sciences

[Abstract] A method used earlier for optimization of systems with deterministic parameters is applied in the present work to the synthesis of optimal filters for systems with random parameters. The method is based on an approximation of the desired optimal characteristic of the filter by a series of orthogonal polynomials. The method can be applied to systems with random parameters when certain conditions are met. The study is based on analysis of a tracking system with negative feedback. Figures 1; references 4 (Russian).

USSR

UDC 62-50

THE MAXIMUM SPEED OF OPTIMAL SYSTEMS WITH PHASE COORDINATE LIMITATIONS

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 141-147 manuscript received 22 Mar 76; after completion 15 Mar 77

AKIMOV, LEONID VLADIMIROVICH, candidate in technical sciences, Dotsent Khar'kov Polytechnical Institute

[Abstract] A study is made of an independent deterministic system, the motion of which is described by a differential equation with limiting conditions placed on the phase coordinates. The task of optimal control for such a system is formulated. The studies of the present article concern problems of determination of the duration of transition of the object, given the limitations imposed, from one position to another position. Equations (31) and (32) allow the time of the speed-optimal control for objects of nth order to be calculated with limitations on all phase coordinates. Equation (33) can be used to synthesize control actions for the input of the object. Figures 1; references 1 (Russian).

USSR

UDC 62-50

NOMOGRAMS FOR MULTIPLE-CRITERION OPTIMIZATION OF THIRD-ORDER CONTROL SYSTEMS

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 148-152 manuscript received 2 Apr 76

KARETNYI, OLEG YAKOVLEVICH, candidate in technical sciences, senior scientific worker VNIIElektroprivod [All-Union Scientific-Research, Planning and Design Institute for Automated Electric Drive in Industry, Agriculture and Transportation] (Chelyabinsk); and SHTESSEL', YURIY BORISOVICH, senior engineer, Chelyabinsk Polytechnical Institute

[Abstract] Ideas are presented for multiple-criterion optimization, based on the principle of equal deterioration of the quality criteria. The control system is described by a vector differential equation with boundary conditions and limitations. Deterioration in the quality criteria results from movement of the system in space, producing an error representing the distance between the vector of the summary state of the system and its required value. Nomograms are presented which actualize the principles set forth in the article for third-order systems. As an example, a system for regulation of the voltage of a type SG-10 DC generator operating into an active inductive load is studied. Figures 5; references 6 (Russian).

USSR

UDC 62-50

COUNTERACTION OF TWO MOVING BODIES. I.

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 2, Feb 78 pp 5-14 manuscript received 30 May 77

MASLOV, A. P., Moscow

[Abstract] A study is made of the process of interaction of two moving bodies over a finite approach time interval. A method is presented for solving the problem of mutual counteraction of two moving bodies in a space of objects considering nonsteady random noise in the communication channel. Optimal strategies are developed for each of the two moving objects. A numerical example is appended, considering the counteraction of an object Q and an object P controlled by a ground-based remote control system. Figures 3; references 9 (Russian).

USSR

UDC 62-50:007

PRINCIPLE OF CONSTRUCTION OF OPTIMAL AND QUASIOPTIMAL CONTROL SYSTEMS IN
TERMS OF SPEED

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 133-140
manuscript received 14 Mar 75

KOLESNIKOV, ANATOLIY ARKAD'YEVICH, candidate in technical sciences, Dotsent
Tagongorskiy Radiotechnical Institute

[Abstract] A new principle is suggested for construction of closed optimal and quasioptimal control systems for linear and nonlinear high-order objects. Systems synthesized on the basis of this principle can be technically simply actualized using standard elements. The approach to synthesis of control systems suggested consists in determining the gain factors for the phase coordinates to achieve optimal speed with acceptable accuracy when the boundary conditions of the system change. The principle suggested allows practically effective rules for optimal and quasi-optimal control to be generated, which can be run on digital computers. Figures 5; tables 1; references 8 (Russian).

HUNGARY

UDC 621.398:621.311.1.089

NEWLY DEVELOPED TELEMCHANICAL SYSTEM FOR CHECKING ELECTRIC TRANSMISSION NETWORKS

Budapest MERES ES AUTOMATIKA in Hungarian Vol 26 No 4, 1978 pp 136-140

DOBLER (Mrs MADAS), MARTA, Research Institute for the Electric Power Industry

[Abstract] The telemchanical system for the National Electric Power Distribution system (OVT), called TELLMA, is described. The system operates as a real-time peripheral device for a computer. It permits high-speed (less than 10 sec for measurements and less than 2 sec for signaling) information transmission, has radial structure, makes optimum use of the telecommunication wires, and has a multi-level hierarchic structure. The first TELLMA system remotely controls the hydroelectric power plant in Kiskore. The system can handle 92 measurements and 744 signals; it has a main center and subcenters. It remotely measures the useful power plant output, the MW and MVar values of transformers, the MW and MVar values of 220 and 120 kV transmission lines at one end, kV values at 220 and 120 kV nodal points, and energy over international cooperative transmission lines. The TELLMA system is modularly built and uses a bus. Thus, expansion is feasible. Information flow between main center and subcenters is through duplex channels. The measured values are transmitted to the center cyclically. The code messages consist of 29-bit code words. Adaptation to the computer is with the aid of 36-bit registers. Figures 3; references 6 (Hungarian).

USSR

UDC 621-501.14

SYNTHESIS OF A UNIVERSAL PSEUDOLINEAR CORRECTING DEVICE

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 179-184
manuscript received 28 Jul 76

GOSTEV, VLADIMIR IVANOVICH, dr in technical sciences, Professor, Kiev Higher Engineering Radiotechnical School. PVO [expansion unknown]; and MANZHULENKO, VALERIY FEDOROVICH, engineer, Adjunct Kiev Higher Engineering Radiotechnical School. PVO

[Abstract] Standardized frequency characteristics are constructed for a universal pseudolinear correcting device produced on the basis of the method of harmonic linearization. These characteristics significantly facilitate the synthesis of a universal pseudolinear correcting device by frequency methods developed for linear correcting devices. The curves generated make it quite simple to determine the required phase-frequency characteristic, attenuation, as well as the parameters of the differentiating and integrating circuits required. Figures 6; references 5 (Russian).

USSR

UDC 62-503.5

CALCULATION OF TRANSIENT PROCESSES IN SYSTEMS WITH PURE DELAY

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 153-158
manuscript received 26 Jan 76

MAKAROV, BORIS MIKHAYLOVICH, senior scientific worker; and FOMIN NIKOLAY GRIGOR'YEVICH, candidate in technical sciences, Dotsent Voronezh Technological Institute

[Abstract] In analysis of linear automatic stabilization systems with "pure" delay assigned either entirely to the object of regulation or entirely to the regulator, it is frequently necessary to determine the reaction of such systems when a "jump"-type perturbation is applied to the object being controlled. The analytic definition of the transient processes in this case is reduced to solution of differential equations with a deflecting argument. The method of calculation of transient processes suggested in this work allows their precise values to be determined and significantly accelerates the process of calculations. The method suggested is particularly effective when electronic computers are used. References 4 (Russian).

POLAND

UDC 621.317.1

APPLICATIONS OF MAGNETIC BUBBLE DOMAINS

Warsaw ELEKTRONIKA in Polish Vol 18 No 12, 1977 pp 487-492

TORBICZ, WLADYSLAW, Institute of Biocybernetics and Biomedical Engineering,
Polish Academy of Sciences

[Abstract] A comprehensive review is presented of techniques connected with magnetic bubble technology. It includes methods and procedures relating to translation, generation, annihilation and detection of bubble domains. Decoders, bubble logic and bubble lattice configurations are examined. Memories with permalloy layers, series-parallel loops, decoders, dynamic organization of information, and memories with bubble lattice are described. These memories are compared with other solutions. Examples of magnetooptic bubble devices are given. Figures 18; references 52: 2 Polish, 50 Western.

EAST GERMANY

DEVELOPMENT TRENDS IN THE FIELD OF MAGNETIC DOMAIN MEMORIES

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 3, Mar 78 pp 155-159

DRAEGER, UTZ, dr.

[Abstract] This review article discusses the principles, uses, advantages, and outlook of magnetic domain memories; specifically it describes the bubble and wall translation memories and compares recent developments with them. At the present time, bubble and wall-translation memories are still not developed to the degree that full justice is done to their potentialities. The primary deficiency is still an inadequate storage density, which may be improved by system solutions geared to the specific use area. Other magnetic-domain memory types under development include the domain-lattice memories and the crosstie memories. They are discussed with special emphasis on lattice insulation, initialization, data transport performance, information reading/writing, comparative overall performance, material of manufacture, coding scheme, and development trends. For crosstie memories, the maximum data density achieved so far is 1.5 to $15 \cdot 10^3$ bits/mm²; the maximum data rate is 20 MHz. Improvements by several orders of magnitude are expected. Figures 11; tables 2; references 20: 1 German, 19 Western.

POLAND

UDC 621.318.4

IDENTIFICATION OF THIN-FILM INDUCTOR MODEL BY OPTIMIZATION METHOD

Warsaw ELEKTRONIKA in Polish Vol 18 No 12, 1977 pp 485-487

BALIK, FRANCISZEK and MICHALSKI, KRZYSZTOF, Institute of Telecommunication and Acoustics, Wroclaw Polytechnic

[Abstract] A method for identification of linear mathematical models of electronic circuit elements for purposes of computer-aided design is presented. The identification has been formulated as an optimization problem. Applying the method described, identification of a thin-film inductor model was made with the aid of a computer program. Calculation of results, using an ODRA 1305 computer lasted 108 seconds. Figures 3; tables 1; references 12: 8 Polish, 1 Western, 3 Russian.

USSR

UDC 621.372.061:621.372.852

ELECTRONIC COMPUTER OPTIMIZATION OF A MICROWAVE FREQUENCY SPLITTER WITH ADJACENT PASSBANDS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 24-28
manuscript received 15 Jul 76; after revision 30 Dec 76

LUGANINA, N. M.

[Abstract] The optimum configuration and parameters of a microwave multiplexer for adjacent passbands are determined with a computer. The input mismatch factor and the losses in the passband of the channels are reduced. Three configurations are analyzed: One with an in-phase power divider, one with a directional coupler, and one with the inputs of dual channel filters connected in parallel. The characteristics were numerically analyzed on the BESM-6 computer. The program language was GDR-ALGOL, and the computer algorithm was based on network matrices, scattering matrices and directional graphs, all of which require less computer time and memory than the use of nodal conductances. Graphs are plotted for the input mismatch factor and the attenuation in the channels. The optimization results were checked experimentally with a breadboarded frequency splitter with filters using opposing rods, in which a provision was made for varying the lengths of the sections between the filters. The relative passbands of the filters were 0.04 and there were four resonators in each of the filters. The filters were based on a strip line with a spacing between the plates of 16 mm, while the nonresonant end rods were short circuited. The plotting of the experimental and theoretical characteristics shows satisfactory agreement between the two. With computer optimization of the lengths of the sections between filters, the input VSWR of the breadboarded filter based on a strip line was no more than 3.3 and the losses in the passbands of the channels was no more than 2.2 dB. Figures 3; references 11: 10 Russian, 1 Western.

USSR

UDC 681.14

OPERATION OF THE 'MINSK-1560' EQUIPMENT IN THE COMPUTING CENTER OF THE
NORTHERN RAILROAD

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 5, May 78 pp 34-36

NEMESHAYEV, S. P., chief of division, Computing Center of the Northern Railroad; and VOLKOV, S. K., deputy chief of division

[Abstract] The paper briefly describes the installation, functions and operation of the "Minsk-1560" electronic computer control device in the Northern Railroad Computing Center. Various modifications had to be made in the Minsk-1560 and related equipment at the center, as well as the connections between the center and subscribers to provide reliable control and exchange with the "Minsk-32" computer. These changes have enabled subscriber-computer and computer-computer dialog modes of exchange at the center. Figures 3.

USSR

UDC 681.335.85

RELAXATION EFFECTS IN MICROELECTRONIC COMPUTING AMPLIFIERS WHEN A NON-
INVERTING INPUT IS CONNECTED TO HIGH-RESISTANCE CIRCUITS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 5, 1978 pp 54-59
manuscript received 29 Aug 77

MEYER, V. V. and NESTEROV, V. I.

[Abstract] In designing wide-band electronic devices based on ultrafast opamp IC's used as multifunctional active devices, the small parameters inherent in the IC must be considered. It has been found that non-inverting signal amplifiers and differential computing amplifiers based on semiconductor IC's where parasitic capacitance cannot be avoided lose their amplifying properties and may behave as relaxation oscillators. The mechanism of self-excitation is caused by the combined action of parasitic and input capacitances. This paper examines the nature of this effect and proposes a technique for determining the main relations that characterize it. The shape and parameters of the relaxation waveforms are analyzed. It is shown that it should be feasible to construct a new class of relaxation oscillators without separate capacitive timing elements. The paper was recommended by the Department for Construction of Electronic Computer Equipment, Ryazan' Institute of Radio Engineering. Figures 4; references 5: 4 Russian, 1 Western.

USSR

UDC 621.397.131:522.617

MEASUREMENT OF THE THRESHOLD SENSITIVITY OF AN ASTRONOMICAL TELEVISION
SYSTEM WITH AUTOMATIC REGISTRATION OF STAR IMAGES

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 57-59 manuscript
received 28 Mar 77

AGAPOV, YE. S., ALEKSANDRIN, YU. S., ANISIMOV, V. F. [deceased], POLYAKOV,
M. A., PTITSYN, I. V. and RYMARENKO, V. L.

[Abstract] A method is proposed for automated evaluation of the sensitivity of a television system to be used in astronomy. The criterion of registration of the image of a point object is the predetermined probability of correct detection for a certain probability of false alarms. A block diagram is given of a system which measures the threshold sensitivity of transmitting tubes on the basis of this criterion. Test results show that the probability of detection of a star image depends on its illuminance level. By using the proposed technique, curves of threshold sensitivity can be plotted and compared in order to determine the effectiveness of using a given transmitting tube under different conditions of image registration. Figures 3; references 5 (Russian).

USSR

UDC 519.87

RECOGNITION OF SOURCE SIGNALS UNDER CONDITIONS WHERE THE OPERATION OF THE SOURCE IS SIMULATED BY ANOTHER SOURCE WHEN THERE IS INTERFERENCE IN THE CHANNEL

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 71-73 manuscript received 16 Jan 77

KUZNETSOV, YU. P.

[Abstract] The author considers the problem of signal recognition of one source when its operation is simulated by another source. Each of the two sources can emit two different signals, and they operate randomly and non-simultaneously. The signals are transmitted through a symmetric channel in the presence of interference of transforming type. At the channel outlet there is an observation system which must make one of three decisions: 1) The first signal has been sent by the first source; 2) The second signal has been sent by the first source; 3) Either signal has been sent by the second source. The solution is found by the methods of game theory, and the optimum strategies are calculated for the observation system. The quality indices (values of the game) are determined for the various parameters of the problem. Figures 1; references 1 (Russian).

POLAND

UDC 621.315.2

FLUOROCOPOLYMER-INSULATED TELECOMMUNICATION HOOKUP WIRES

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish Vol 51 No 2, 1978 pp 43-45

LAPINSKI, TADEUSZ, Research and Development Center of Cable Industry
KABLOSPRZET

[Abstract] Chemical, mechanical, electrical and climatic properties of the ECTFE type fluorocopolymer are described. Structural and technological characteristics of ECTFE-insulated assembly wires and methods of their testing are discussed. Figures 4; tables 4.

USSR

UDC 621.315.592

AUTODYNE OPTICAL SIGNAL DETECTOR

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 32-35

MEDVEDEV, YU. V., RAKSINA, F. P., and POPOV, L. N.

[Abstract] A study is made of the possibility of building a photoresistor receiver with variable bias, which combines high sensitivity with simplicity, compactness and low weight, and is simplified by using the autodyne principle of construction in which the photoresistor is included directly in the resonance generator. The detector obtained with a reduced number of elements has lower requirements with respect to the stability of the generator frequency and the recorder (detector and amplifier) noise. An analysis of the threshold sensitivity and inertia of the given optical detector based on a tube autodyne is performed using a high resistance silicon photoresistor of the photosensitive element.

The plotted relation for the variation of the discharge current as a function of the relative power variation connected with a variation of load indicates that the reaction of the optical autodyne to a change in load increases with a decrease in the pumping current. The explanation for this phenomenon lies in decreased operating stability of the laser with a decrease in the pumping current and indicates the common property of autodyne systems for recording the usual signal. Figures 3; references 2 (Russian).

USSR

UDC 621.372.54.018.576

AN ALGORITHM FOR CALCULATING THE CORRELATION BETWEEN SPECTRAL COMPONENTS IN THE BASIS OF WALSH FUNCTIONS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 108-111
manuscript received 21 Jan 77; after revision 17 Mar 77

ZHDANOV, A. I. and RESHETOV, L. A.

[Abstract] An approach is proposed to spectral analysis of random signals based on writing Walsh functions in the form of Hadamard matrices, which simplifies computations and gives the values of the correlation at 2^n points directly for any pair of Walsh functions. References 4: 1 Russian, 3 Western.

USSR

UDC 621.373.0.29.64.001.5

ANALYSIS OF FREQUENCY MODULATION UNITS AND AUTOMATIC TUNING CONSIDERING THE NONSTATIONARY PROCESSES IN OSCILLATORS

Moscow RADIOTEKHNIKA I ELECTRONIKA in Russian No 4, 1978 pp 759-770 manuscript received 2 Aug 76

GOMOZOV, V. I.

[Abstract] A description is presented of a procedure for calculating the shape of the modulating voltage by the given law of variation of the frequency, considering the nonstationary processes in controlled oscillators. An analysis is made of the effect of the nonstationary processes in the generators at a high-frequency modulation rate on the qualitative indexes of the automatic frequency or phase controls. The nonstationary processes caused by the nonlinearity of the frequency modulation characteristic and the inertia of the oscillators must be considered when developing high-speed frequency modulation and automatic tuning devices. The circuit diagrams and generator characteristic are proposed as objects of control, and the calculation technique can be used in practice for analysis of the qualitative indexes of the automatic tuning system and for evaluation of the shape of the special voltages which are required at high speed, and the precision of the frequency modulation for correction of the nonlinearity of the frequency modulation characteristic of the oscillators and the amplification coefficient of the channel of the automatic frequency control systems. The primary theoretical principles are confirmed experimentally for a number of oscillators with electronic and electrical frequency control. The author thanks O. I. Sukharevskiy for conducting calculations on a digital computer. Figures 6; tables 2; references 11: 10 Russian, 1 Western.

USSR

UDC 621.376.32

A STUDY OF AN AUTOMATIC FREQUENCY CONTROL SYSTEM FOR LINEAR FREQUENCY MODULATION WITH A METER USING A DELAY LINE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 46-55 manuscript received 19 Jul 76; after revision 21 Jan 77

KOCHEMASOV, V. N.

[Abstract] Automatic frequency control systems for linear frequency modulated signals, in particular, for a system using an error signal meter based on a delay line, are especially effective in dealing with fast retuning rates and large values of the product of the frequency deviation and the signal duration. The two specific systems which are analyzed involve a linear FM

AFC system using a difference frequency error signal meter and an AFC system using an intermediate frequency error signal meter. The latter can be necessary because of poor AFC quality with high frequency perturbations or because of a small range of permissible mistuning. These deficiencies are caused by the slow response of the error signal meter, which is circumvented by measuring the error signal at the intermediate frequency. Detection at the intermediate frequency also permits an increase in the quality of linear FM AFC system operation, provided that the additional components in the error signal meter do not introduce any substantial distortions. The mathematical treatment yields recommendations for the choice of the filter parameters and the delay time, and expressions are derived for a useable quality improvement criterion because of the use of AFC, as well as the AFC cutoff frequency, the permissible level of initial perturbations, and the conditions under which it is possible to linearize the modulation characteristic of the controlled oscillator. Figures 4; tables 3; references 8: 6 Russian, 2 Western.

USSR

UDC 621.376.326

A STUDY OF THE NOISE IMMUNITY OF A MULTICHANNEL DEMODULATOR FOR FM SIGNALS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 110-113
manuscript received 20 Jul 76; after revision 19 Jan 77

TARAKANOV, YU. I. and SHEVYAKOV, M. M.

[Abstract] A multichannel FM demodulator differs from the standard FM detector by the existence of a series of parallel channels, each of which contains a filter and an FM detector, as well as an adder which sums the output voltages of the channels. It is shown that when receiving wideband FM signals against a background of noise interference, the multichannel FM detector exhibits increased noise immunity as compared to the standard FM demodulator. Multichannel detector linearity is evaluated and it is found that where the system parameters do not differ by more than 5 to 10 percent from the optimal values, a nonlinearity of the detector characteristic of no more than 1 percent is assured. Graphs of the output signal-to-noise ratio for the two types of detectors are plotted as a function of the input signal-to-noise ratio, and both the theoretical and experimental values confirm the advantage of multichannel detection over conventional detection while simultaneously increasing the linearity of the discriminator characteristic. Figures 3; tables 1; references 2 (Russian).

USSR

UDC 621.391

CONVERSION OF NONGAUSSIAN RANDOM PROCESSES BY RADIOTECHNICAL DEVICES

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 91-95 manuscript received 6 Jun 77

SAFIULLIN, N. Z. and CHABDAROV, SH. M.

[Abstract] A procedure which makes maximum use of accumulated experience and known solutions of gaussian problems under complex conditions which are important in practice and which permit automation of computer calculations is proposed for analyzing linear and nonlinear devices with nongaussian effects. The procedure is based on the representation of multidimensional probability densities by mixtures of gaussian densities and generation of a general solution in the form of a set of solution known from correlation theory. An example of the transmission of the sum of a signal and nongaussian noise through an intermediate frequency amplifier and linear detector is used to illustrate the procedure and the convenience of the derived expressions for computer calculations. The two-dimensional probability density of the output voltage of the intermediate-frequency amplifier and linear detector system calculated by the procedure is illustrated. Figures 1; references 6 (Russian).

USSR

UDC 621.391

PROBABILITY OF ERROR IN A SYSTEM WITH MULTIPHASE MODULATION UNDER THE EFFECT OF AN INTERFERENCE SIGNAL AND THERMAL NOISE

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 19-25 manuscript received 14 Jul 76

MAKOVEYEVA, M. M. and TARASOV, S. S.

[Abstract] Tabulated functions are used to investigate the probability of errors occurring in a communications system with relative phase modulation under the effect of harmonic interference and thermal noise on the receiver input. The derived expressions and tabulated functions are preferable to the multiple integrals previously used to perform the calculations on a computer with the expenditure of large amounts of machine time.

The results obtained using the described experimental setup agree with the theoretically expected results and demonstrate their suitability for calculating the electromagnetic compatibility of digital radio relay lines using relative phase modulation, with other digital communications systems operating in common frequency bands. Figures 7; references 5: 1 Russian, 4 Western.

USSR

UDC 621.391

DETECTION OF NOISE SIGNALS AGAINST A BACKGROUND OF CORRELATION INTERFERENCE
WITH MULTICHANNEL PROCESSING

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 98-100
manuscript received 26 Nov 76; after revision 16 Feb 77

SHELUKHIN, O. I.

[Abstract] The author considers detection of a stochastic signal by a multi-channel system, and determines the influence that the number of identical reception channels has on the characteristics of detection of a noise signal with predetermined statistical characteristics over a finite time interval. Expressions are given for the probabilities of correct detection and false alarm. The results of calculations by these expressions for an exponential correlation function show that in some cases it is feasible to get satisfactory characteristics in a time limited to two to three signal correlation times. An increase in the number of channels considerably relaxes the requirements for the signal-to-noise ratio which ensures the required reliability of correct detection. Figures 2; references 6 (Russian).

USSR

UDC 621.391

EFFICIENCY OF RECEPTION 'ON THE WHOLE' WHEN INFORMATION IS TRANSMITTED WITH
SYMBOL SPACING THROUGH CHANNELS WITH FADING

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 32-38 manuscript received 5 Apr 77

SOKOLOV, V. V. and PELEKHATYY, M. I.

[Abstract] An investigation is made of the feasibility of appreciably increasing reliability of data transmission with symbol spacing of code words in radio channels with fading by using reception "on the whole." In this technique, received symbols in periods of fading are not simply taken as erroneous, but are linearly added with other symbols of the given code word including those that have a "redundantly high level." As a result, the insufficient energy of the signal during periods of fading is compensated by signals with high energy. The interference immunity of the method is evaluated. It is shown that the use of reception "on the whole" with decorrelation of symbols considerably increases the reliability of discrete data transmission in channels with fading, particularly when error-correcting codes are used. When the number of the symbols in the code words is sufficiently large, communication reliability can be brought practically to the

level of channels without fading. Reception "on the whole" with symbol spacing is most readily realized by using recurrent codes and the Witherby algorithm. The results of statistical modeling on a digital computer confirm the theoretical feasibility of considerably improving the efficiency of discrete data transmission in channels with fading by using the proposed technique. Figures 3; references 8: 6 Russian, 2 Western.

POLAND

UDC 621.391

DEVELOPMENT TRENDS IN PRESENT-DAY MARITIME RADIO COMMUNICATION

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish No 1, 1978 pp 12-15

CZAJKOWSKI, JERZY, Institute of Automation and Radio Communication, Higher Naval School, Gdynia

[Abstract] The development of maritime systems of radio communication, their technological characteristics, and the prospects for the future are discussed. Essential questions concerning conditions of work and technical requirements for systems and equipment defined and approved by the International Conference of Radio Communication (Geneva, 1974) are examined.

USSR

UDC 621.391.1

CORRELATION FUNCTION OF PHASE-KEYED SIGNALS WITH RESTRICTED PASS BAND

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 844-846 manuscript received 16 Jun 76

BORAVENKOV, V. N., GOLIKOV, O. B., and USTINOV, B. A.

[Abstract] A numerical and analytical study is made of the mutual correlation function of the initial and distorted phase-keyed signal based on segments of a line of $N = 2^{m-1}$ Hoffman sequences M_1^m ($m = 3, 4, 5, 6$) with resonance restriction of the pass band of the communications channel by a single-stage resonance filter with given transmission coefficient. The given resonance restriction has a significant effect on the properties of the mutual correlation function for a wide range of variation of τ_1/τ_e (τ_1 is the time constant of the stage and τ_e is the duration of the initial code element), limiting the speed of the data transmission for the given τ_1 . An explanation is given for the increase in the explicitly expressed asymmetry of the mutual correlation function of the phase-keyed signals with an increase in τ_1/τ_e . The amount of machine time required for the calculations of the phase-keyed signals on the basis of long-duration codes has been eliminated by the statistically derived laws. Figures 3; references 3 (Russian).

USSR

UDC 621.391.14

RECONSTRUCTING A FIELD WITH FINITE SPECTRUM FROM READINGS OF THE SIGNALS OF A FILTERING SYSTEM

Moscow PROBLEMY PEREDACHI INFORMATSII in Russian Vol 14 No 2, Apr/Jun 78 pp 53-60 manuscript received 16 Apr 76

YEFIMOV, S. P.

[Abstract] An investigation is made of the feasibility of reconstructing a field from signal readings at the output of K filters with N -dimensional band-limited function. Readings are taken at points which form a regular N -dimensional lattice. Limitations are found on the dimensions and shape of the region of finiteness of the spectrum of the field represented as an analog of the Kotelnikov-Shannon expansion. It is shown that an increase in the number of filters reduces the redundancy of the system of readings without limit if the region of finiteness of the spectrum is approximated by a set of regular hexagons. The author thanks Ya. I. Khurgin for discussing the work and V. P. Yakovlev for support. Figures 1; references 10: 4 Russian, 1 Czech, 5 Western.

USSR

UDC 621.391.14

A NOTE ON EVALUATING A SPECTRAL FUNCTION

Moscow PROBLEMY PEREDACHI INFORMATSII in Russian Vol 14 No 2, Apr/Jun 78
pp 61-66 manuscript received 7 May 76

LEVIT, B. YA. and SAMAROV, A. M.

[Abstract] The authors consider a sequence of experiments generated by a real gaussian sequence with zero average and unknown spectral function. Conditions of asymptotic nonimprovability of the estimate of this spectral function are determined for a wide class of loss functions, assuming that the set of permissible spectral functions includes all those for which $\int_0^\infty f^2(\lambda) d\lambda < \alpha$, where $f(\lambda)$ is the spectral density of the observed process. References 7: 5 Russian, 1 Czech, 1 Western.

USSR

UDC 621.391.2

RANK SIGNAL DETECTION WITH LARGE DYNAMIC RANGE

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 66-69 manuscript received
19 May 76

AKIMOV, P. S. and YEFREMOV, V. S.

[Abstract] An investigation of the problem of the incoherent detection of a pulse signal with known amplitude against a background of Gaussian noise, after logarithmic conversion of the envelope, shows that logarithmic amplification together with rank processing makes it possible significantly to increase the dynamic range of a receiver without negative effects on the detection quality. It also becomes possible to ensure a given probability of false alarm which is stable with respect to the parameters of the logarithmic converter and the noise parameters. Figures 1; references 5 (Russian).

USSR

UDC 621.391.2

CALCULATING THE TIME DISTRIBUTION BETWEEN PHASE DISCONTINUITIES OF THE SUM OF THE HARMONIC SIGNAL AND NARROW-BAND NORMAL NOISE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 726-634
manuscript received 4 Oct 76

BELOUS, A. V.

[Abstract] The distribution density of the time intervals before the appearance of a phase discontinuity of the harmonic signal and narrow band normal noise was determined under the condition that the normal process is stationary, the central frequency ω_0 of the spectrum coincides with the frequency of the harmonic signal, the correlation coefficient is given by an exponential expression, and the mean value is equal to zero. The phase discontinuity is considered for a nondifferentiable Gaussian process. The approximate expressions are obtained under various initial conditions for the characteristic function, the distribution density and the mean waiting time of the discontinuity. A discussion is presented of the distribution density of the duration of the surges of the ergodic Markoff process, the interval distribution density between phase discontinuities by two procedures. It is shown that the sequence of events determining the onset of the phase discontinuity and formulated for the set of quadrature components remains valid for any narrow-band process, but in general the calculation of the characteristics of the dependent orthogonal components is complicated. Figures 1; references 9: 8 Russian, 1 Western.

USSR

UDC 621.391.2

THE TRANSFORMATION OF THE CHARACTERISTICS OF FM DISCRIMINATORS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 98-102
manuscript received 14 May 76; after revision 9 Aug 76

STEKLOV, V. K.

[Abstract] Methods are proposed for expanding the working range of a frequency discriminator by means of nonlinear elements inserted at the input and output of the discriminator. When the difference between the center frequency and the input signal frequency is half of the passband, a nonlinear (threshold gate) element is inserted, the output signal of which changes the tuned frequency of the FM discriminator in a step by the amount of half the passband and clamps the output signal of the discriminator in accordance with the mistuning at this value of half the passband, and with

a further increase, the characteristic shifts along the frequency axis without changing its shape. This displacement is of a step nature, and its direction is determined by the sign of the mistuning. With a new tuning frequency, the output signal of the discriminator is again a linear function of the mistuning within the limits of the working range. Because the output voltage of the FM discriminator is stored with the initial tuning, corresponding to the boundary of the linear range, the size of the equivalent working range is increased. A method using relay type elements consisting of a single amplifier and a relay connected in parallel to generate the necessary correcting functions is presented. The working range of an FM discriminator can be increased by $(n + 1)$ times by using n relay elements. Figures 3; references 1 (Russian).

USSR

UDC 621.391.2

TRUNCATED SEQUENTIAL ANALYSIS OF SIGNALS UNDER CONDITIONS OF A PRIORI IN-DETERMINACY

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 120-123
manuscript received 20 Jan 76

SHLOMA, A. M.

[Abstract] The sequential detection of signals against a background of normal interference with an unknown dispersion is treated. A method of curtailing the average number of observations when a signal is not present has been described in the literature where the lower threshold is varied as a function of the sample dispersion. It is shown that the same result can be obtained by means of cutting off the lower threshold as a function of the sample dispersion. Criteria are given for which truncated sequential analysis yields a fewer number of observations. An expression is derived for the average number of observations when a signal is present and the upper threshold is not truncated. References 2 (Russian).

USSR

UDC 621.391.2

QUASI-COHERENT RECEPTION OF COMPLEX FM-SIGNALS WITH PASSIVE INTERVAL

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 856-860
manuscript received 23 Mar 76; after revision 24 May 77

CHERDYNTSEV, V. A. and BURTSEV, A. A.

[Abstract] The example of complex phase-keyed signals is used to investigate the effect of the passive intervals, which occur in particular during regular scanning of the radiation pattern of a receiving or transmitting antenna, on the structure of an optimum receiver and the precision of estimating the digital and analog parameters of the passive intervals. This is the first formulation of the problem of quasi-coherent reception of complex phase-keyed signals with passive interval in the given statement. The structural synthesis of the receiver is discussed, and the quasi-coherent receiver is analyzed in order to estimate the accuracy of filtration of the analog parameters in the form of random processes given by stochastic differential equations. Figures 3; references 7 (Russian).

USSR

UDC 621.391.2

AN ANALYSIS OF THE EFFECTIVENESS OF DIGITAL SYSTEMS FOR INTERPERIOD PROCESSING

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 77-82
manuscript received 15 Mar 76; after revision 17 Jan 77

POPOV, D. I.

[Abstract] The interperiod processing of signals against a background of passive noise reduces to the rejection of the interference and to storing the signal, and is accomplished using comb filters. A characteristic feature of digital processing systems is the existence of level quantization errors caused by the limited length of the digital network of analog-digital converters, and the arithmetic devices of the digital filters. These errors influence the effectiveness of the processing systems. The influence of level quantization errors on interperiod, digital processing systems in the steady state mode is analyzed for various types and configurations of digital rejection and bandpass filters. A system of practical importance is analyzed, using rejection in two quadrature channels and subsequent incoherent storage. Graphs showing the false alarm probability as a function of the detection threshold and the detection characteristics of the digital processing system are plotted for systems with equally weighted and exponentially

weighted storage devices, as well as digital rejection filters with multi-dimensional inputs and outputs. The digital rejection filter with a multi-dimensional input, by providing for a set loss level with a shorter digital network length, simplifies the design of the filter. A comparison of the effectiveness of the two systems where the correct detection probability is 0.5 and the number of digital places is 8 or more shows that in the steady-state mode, i.e., with extensive noise, the deficiency of exponentially weighted storage where the feedback coefficient is 0.625, as compared to equally weight storage, does not exceed 3 dB. In the transient mode, i.e., with discrete interference, the effectiveness of a system with a recirculator where the feedback coefficient is 0.625 proves to be the same. The results of statistical simulation on a digital computer, taking the limited number of places in the network of digital filters into account, are in sufficiently good agreement with the above results and confirm the models used for the quantization and rounding-off noise. Figures 3; tables 1; references 6: 5 Russian, 1 Western.

USSR

UDC 621.391.2

DETERMINING THE TIME POSITION OF A SIGNAL PULSE BASED ON ITS MAXIMUM BY MEANS OF BINARY STORAGE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 123-125
manuscript received 8 Oct 75; after revision 9 Feb 77

PAVLOV, V. D. and DIANOV, A. P.

[Abstract] Mathematical simulation is used to study the statistical properties of the local maxima of a mixture of a rectangular signal and white noise, passing through a matched filter and a linear AM detector, and the precision in the estimation of the time position of this signal. The time interval was broken down into 30 numbered channels, and the realization of the signal and noise, which have a triangular correlation function, was placed so that the signal maximum in the absence of noise was in the 15th channel. A certain threshold was set, and following the threshold gate, the maxima of the random process which exceeded the set threshold were registered and stored during 10^4 realizations. The average number of stored pulses in a channel was determined with reference to the number of realizations studied. The analysis was carried out for signal-to-noise ratios of 1, 2 and 4, and ratios of the threshold voltage to the effective noise voltage of 0, 1, 2 and 3. The distribution of the average number of pulses stored in a channel was plotted as a function of the channel number for threshold ratios of 1 and 7 and signal-to-noise ratios of 1 and 2. The correlation properties of the local maxima of the random process were also studied and represented

graphically. The accuracy of the proposed procedure was evaluated in a computerized experiment in order to determine the dispersion, where 10 to 25 channels were analyzed. An analysis was also made of random process maxima above the threshold over k realizations. The results of 100 trials were used to determine the dispersion for various signal to noise ratios, values of k , and threshold ratios. It was found that the dispersion depends only slightly on the threshold and the minimum of the dispersion is achieved for a threshold ratio of about 1:2. With an increase in the number of storage operations, the dispersion falls off. The proposed method was also checked by estimate simulation using a maximum plausibility procedure, and good agreement was found. The frequency of the appearance of local maxima in the noise channels is almost independent of the number of the channel, and is substantially less than the probability of the appearance of maxima in the signal channel. For a case of practical interest where the signal-to-noise ratio is 1 and the number of storage operations $k = 100$, the mean square measurement error in the proposed method is only 1.8 times greater than that for the maximum plausibility procedure. References 1 (Russian).

USSR

UDC 621.391.2

EFFECTIVENESS OF TWO-CHANNEL PROCESSING OF RAPID ACQUISITION SEQUENCES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 101-103
manuscript received 13 Oct 76; after revision 7 Feb 77

LOSEV, V. V.

[Abstract] The author considers a modification of a dichotomizing search for processing of rapid acquisition sequences in which the region of indeterminacy is divided into four parts on each step, and search terminates in $\lceil \log_4 N \rceil$ steps, where $\lceil x \rceil$ is the closest integer larger than or equal to x , and $N = 2^n$ is the length of the rapid acquisition sequence. A two-channel receiver is required for such processing. Expressions are found for the overall probability of erroneous synchronization and the time gain realized from introducing a second channel. References 4: 3 Russian, 1 Western.

USSR

UDC 621.391.2

RANK SEQUENCE DETECTION OF SIGNALS AGAINST A BACKGROUND OF NOISE AND RANDOM PULSE INTERFERENCE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 60-64
manuscript received 11 Apr 77; after revision 18 Jul 77

AKIMOV, P. S. and KUBASOV, A. N.

[Abstract] The authors consider the problem of sequential incoherent detection of a signal against a background of noise and random pulse interference, using algorithms based on analysis of the likelihood ratio of the sum of ranks or the result of binary quantization in order to simplify calculation of the likelihood ratio and realization of a detector. Both techniques simplify detector construction, although binary quantization of ranks is somewhat less effective than detection based on the sum of ranks. Comparative analysis of the quality characteristics of the binary rank procedure and that based on the sum of ranks shows that the latter is less sensitive to the effect of random pulse interference because it gives a higher detection probability and requires fewer observations when the signal-to-noise ratio is low. Figures 3; references 6 (Russian).

USSR

UDC 621.391.23:621.376.52

QUASI-COHERENT RECEPTION OF BINARY CARRIER TELEGRAPH SIGNALS DURING FLUCTUATION OF THE CYCLE FREQUENCY

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 40-44 manuscript received 1 Nov 76

BURDZEYKO, B. P. and PARAMONOV, A. M.

[Abstract] The structure of a receiver for quasi-coherent reception of binary carrier frequency signals during fluctuation of a cycle frequency which is described by a Markov process with the assumption that the signal is received against a background of white noise and that the signal-to-noise ratio is sufficiently large for the Gaussian approximation of an algorithm for measuring the synchro parameter to be valid.

The recurrent equations are analyzed in order to estimate the synchronization of the cycle frequency in the carrier. The noise immunity of the quasi-coherent reception of the given signals is estimated, considering the effect of all of the real parameters controlling the fluctuations of the carrier and cycle frequency on the noise immunity. Figures 4; references 6 (Russian).

USSR

UDC 621.391.26

A DISCRETE ESTIMATION METHOD FOR THE PHASE FLUCTUATION SPECTRUM OF A NARROW BAND RANDOM PROCESS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 118-120
manuscript received 28 Jun 76; after revision 20 Feb 77

FAL'KOVICH, I. S.

[Abstract] The initial data for a discrete algorithm for measuring the spectrum of phase fluctuations in a narrow band random process are the time sequence of zeros for the process studied. The case considered is limited to the class of weak fluctuations, for which the phase fluctuation is much less than unity, something which is characteristic of a number of practical applications (certification of frequency standards, evaluating the quality of standard time signal transmission). The sequence of "positive" zeros of the process $u(t)$, i.e., zeros for which $du(t)/dt$ is greater than zero is used as the initial data. Because the number of these zeros is usually extraordinarily high, the amount of data fed into the computer can be reduced by eliminating all possible redundancy, and this accomplished by introducing the concept of passing k zeros, which are more narrowly defined. An expression is given for the maximum permissible number of k passed zeros and it is shown that the spectrum of the phase fluctuations of the narrow band process is completely defined by the time sequence of "positive" zeros of the process passing k zeros. The equipment designed to realize this method consists of using circuits to generate pulses at the moment the process $u(t)$ goes through zero, with the subsequent division of the repetition rate of the generated pulses by $(k + 1)$ times. The moments of the appearance of the pulses at the output of the frequency divider are registered on a digital frequency meter and fed to the computer for subsequent processing using the algorithm derived. References 1 (Russian).

USSR

UDC 621.391.63

INVESTIGATION OF THE REGULATING ELEMENTS OF OPTICAL AGC SYSTEMS BASED ON LIQUID CRYSTALS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 98-100 manuscript received 7 Jul 77

BARNIK, M. I., ZBOROVSKIY, A. A., IVANOV, B. B. and YUDIN, S. G.

[Abstract] The authors investigate devices for controlling the signal level in an optical channel on the basis of electro-optical effects in nematic liquid crystals. Devices are considered which use the effects of dynamic

scattering of light as well as the T and S effects in nematic liquid crystals for automatic gain control. The results of the study demonstrate the feasibility of making optical AGC devices using liquid-crystal cells which are characterized by a wide range of control of the optical input signal (30-40 dB), low control voltage (5-50 V), long service life (at least 10,000 hours in hermetically sealed cells with operation on alternating current at 50 V), and low energy consumption. When cells with dynamic scattering of light are used, the transmission factor is higher than for T and S cells because no polaroids are necessary. If the incident signal is polarized, T and S cells should be used. Higher speed can be achieved with T cells. Figures 5; references 6: 5 Russian, 1 Western.

USSR

UDC 621.391.8

DIGITAL SIMULATION OF THE NOISE IMMUNITY OF OPTIMUM MULTICHANNEL PHASE TELEGRAPHY RECEIVERS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 56-63
manuscript received 3 May 76; after revision 1 Nov 76

KON'KIN, A. V. and KUL'MAN, N. K.

[Abstract] The noise immunity of optimum multichannel phase difference telegraphy reception systems is investigated and the specific case of frequency diversity in a vector shortwave communications channel is analyzed. The conditions are: 1) The discrete informational sequence is identical for each point in time in the separate diversity branches; 2) The variations in the channel parameters are slow as compared with the keying rate, and 3) The fluctuations in the channel parameters are independent in the individual diversity branches. The effect of steady-state noise which reduces the reception noise immunity is also treated. Empirical error probabilities are computed using the Monte Carlo method for different variants of phase telegraphy and phase difference telegraphy with the BESM-6 computer. The results of simulating optimum and suboptimum quasi-coherent receivers, as well as incoherent receivers, with and without an adaptive return channel for control of the transmitted signal power are presented in tabular form in terms of the signal-to-noise ratio, the interference-to-signal ratio and the error probabilities for phase difference and phase telegraphy signal receptions for the various cases considered. The noise immunity advantage of adaptive, quasi-coherent reception is quantitatively demonstrated. In addition, using an algorithm for quasi-linear filtration, an optimum automatic gain control system can be realized for the receivers. Figures 1; tables 7; references 4 (Russian).

AN EXPERIMENTAL CHECK OF THE DISTORTIONS IN THE PHASE DISTRIBUTION OF A DISCRETE DELAY LINE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 94-97
manuscript received 8 Jun 76; after revision 9 Mar 77

VESHKURTSEV, YU. M. and BRONSHTEYN, B. G.

[Abstract] In determining the probability characteristics of the phase of a radio signal, a promising approach is the generation of a reference signal by means of a discrete delay line, designed around integrated circuit shift registers. However, such a design influences the actual phase distribution of the input signal. The distortions in the laws governing the distribution of the phase of a discrete delay line are checked experimentally and the experimental data are compared with theoretical data from Soviet literature. The error introduced by a digital delay line into the phase distribution of signals at the information input can be broken down into two components: 1) The error caused by the composition of the phase distribution of the irregular phase component of the signal at the delay line information input and the distribution of the irregular component of the signal phase at the clock input to the delay line; and 2) The error caused by the deviation from the ideal of the restoration of the actual phase distribution because of the digital delay line mechanism. These two components are quantitatively computed on a "Nairi-2" computer for the normal and uniform phase distributions frequently encountered in practice. The theory was checked experimentally with a delay line consisting of 10 K2TK171A integrated circuits and an instrumentation complex which measured the differential law governing the distribution of phase fluctuations. The law governing the phase distribution of signals at the information input to the delay line was initially checked where these signals were generated by means of summing the output of a 120 KHz crystal oscillator and wideband noise. Using a second circuit, the law governing the phase distribution of the output signals of the digital delay line was checked. A methodical error appears because of the finite volume of data used in the measurements and depends primarily on the duration of the random process. Because of the absence of the requisite a priori information, this error was determined during the experiment itself, which was comprised of individual realizations with a duration of 2 minutes. The overall experimental error was no more than 0.1 percent. An expression is given for the mean square value of the distortion introduced in the phase distribution by a digital delay line. The determining factor for the error magnitude and the nature of its change is the form of the phase distribution of the clock generator signals. If it is a normal law, with an increase in the number of the time quantizations of the input signals, the error practically does not change. However, if the law is a uniform distribution, then with an increase in the number of time quantizations, the error falls off to zero. There is good agreement between theory and experiment. Figures 4; references 4 (Russian).

USSR

UDC 621.391.8

THE PROCESSING OF CRT OUTPUT SIGNALS IN INFORMATION CONVERTERS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 83-87
manuscript received 20 May 76; after revision 22 Nov 76

ABAKUMOV, V. G. and ZINCHENKO, V. YA.

[Abstract] When an input signal is written by an electron beam on a cathode ray tube, and subsequently read out by the beam, the potential track of the output signal amplitude decreases proportionally to the cosine of the readout angle. However, if the potential relief is formed by light radiation, the amplitude of the CRT output signal (transmitting tube) does not depend on the readout angle. In both cases, the duration of the output signal increases with an increase in the readout angle, and the output signal retains a bell-curve waveform. The precision and reliability of CRT information converters are analyzed for both white noise and normal steady-state noise with known spectral densities, defined in terms of the noise dispersion and cutoff frequency. The signal-to-noise ratio is shown in graphical form as a function of the readout angle. The matching of optimum and suboptimum filters to the signal is treated and various matching criteria are presented for white noise, correlated low frequency noise and various signal-to-noise ratios. Figures 4; references 3 (Russian).

USSR

UDC 621.391.82

REDUCING THE DISTORTING INFLUENCE OF PREDOMINATING MODULATING INTERFERENCE

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 82-85 manuscript
received 27 Apr 77

YESIPENKO, V. I.

[Abstract] The author considers discrete message transmission systems in which received symbols are distorted by the predominance of multiplicative (modulating) interference over additive interference. It is shown that such distortions can be reduced by altering the form of nonlinear processing preceding a video filter matched to the useful signal so that the voltage at the filter input is proportional to the square of the envelope of the received signal. Figures 4; references 7 (Russian).

USSR

UDC 621.391.837

PROBLEM OF SILHOUETTE RADIO VISION

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 p 882 manuscript received 16 Jul 76

MISEZHNIKOV, G. S. and SHTEYNSHLEYGER, V. B.

[Abstract] An experimental device was built in order to study the effect of silhouette radio vision. This device included a generator, receiver and antenna using a microwave signal source made up of a standard measuring klystron generator in the millimeter band. A parabolic antenna was used, the ray of which was focused on the object investigated at a spot, the diameter of which was an order less than the dimensions of the object. A sample picture obtained by the radio vision technique of a truck against a diffusely reflecting background is shown. A very brief, superficial discussion of how radio vision works is offered. Figures 1; references 5 (Russian).

USSR

UDC 621.391:681.335.8

PROBLEMS OF THE THEORY AND IMPLEMENTATION OF ANALOG SIMULATORS OF MULTI-BEAM RADIO CHANNELS

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 26-31 manuscript received after revision 21 Mar 77

BERDNIKOV, A. A., BRUSENTOV, A. G., KONTOROVICH, V. YA., and LYANDRES, V. Z.

[Abstract] A study is made of the methods of electronic simulation of a fading signal as a random process with given statistical characteristics which permits the creation of an all-purpose shortwave radio channel simulator. The constructed simulator shapes six independent beams with general fadings in each. A low-frequency information signal $S_{LF}(t)$ in the 0.3 to 3.4 kilohertz band goes from the input through the low-frequency filter to a multiple-lead delay line, and is fed from arbitrarily selected outputs to modulators. The independent fading carriers formed by fading modules go to the other inputs of the modulators. The fading radio signals at the outputs of the modulators are summed and then one side band is filtered, and the signal is converted back to the 0.3 to 3.4 kilohertz band. The digital implementation of the discussed simulation principles can be used on a computer, and the six beams in the simulator make it possible to organize two multibeam channels for dual reception tests in addition to the simulation of multibeam operation in a restricted time dispersion range. Figures 3; references 11: 10 Russian, 1 Western.

USSR

UDC 621.394.147:621.391.883

DISTRIBUTION OF THE MULTIPLICITIES OF ERRORS IN A FADING CHANNEL WITH CODE SEPARATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 71-74
manuscript received 20 May 77; after revision 16 Aug 77

MAKAROV, A. A. and KOVYAZIN, V. I.

[Abstract] A formula is presented for calculating the distribution of error multiplicities in a discrete communication channel with code separation in order to determine the effectiveness of using correcting codes in a channel with fading. Cases of frequency modulation and relative phase modulation are considered for data transmission in shortwave channels with frequency separation close to the interval of correlation of frequency-selective fading, where the correlations of the subchannels are described by a three-diagonal matrix. The authors give some results of calculations which show the influence of the correlation coefficient and the signal-to-noise ratio on the error distribution in the subchannels. The influence of correlation is intensified with an increase in the number of elements in a combination, which must be taken into consideration in evaluating error-correcting codes. Figures 3; references 3 (Russian).

POLAND

UDC 621.395.8

MICROELECTRONIC SIGNAL SPLITTERS FOR TELEPHONE SETS AND TELECOMMUNICATION LINES

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish No 1, 1978 pp 1-6

GROBELNY, MIECZYSLAW, Institute of Telecommunication and Acoustics, Wroclaw Polytechnic

[Abstract] In connection with the introduction of integrated circuits and the integration of various telecommunication services using common transmission lines, telephone sets are at present in a stage of modernization. The paper describes new active electronic circuits of linear signal splitters composed of transmitting, receiving and compensating amplifiers. A diagram is shown of transistorized circuit formed by three differential amplifiers and designed in accordance with semiconductor monolithic technology for telephone sets, teletransmission and radio communication lines operated from a local battery. Two circuits of nonsymmetric active linear signal splitters for telephone sets and teletransmission lines operated from a central battery are also shown. The problem of central current supply to splitters and through-amplifiers used in long-distance traffic is examined. Figures 7; references 17: 13 Polish, 3 Western, 1 Russian.

POLAND

UDC 621.395.63

AUTOMATION OF TESTS OF SIGNALLING UNITS OF PCM 30/32 TELETRANSMISSION SYSTEMS

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish Vol 51 No 2, 1978 pp 36-38

ZIENTALSKI, MARIAN, Institute of Telecommunications, Gdansk Polytechnic

[Abstract] The start of series production in Poland of PCM 30/32 teletransmission systems necessitated development of a suitable device for prompt automatic testing of vital circuits and location of damages. The principles of automation of the production tests of S-511 signalling units which form part of terminations of the PCM 30/32 systems are discussed and one of the variants of device in question is described. Figures 2.

CZECHOSLOVAKIA

UDC 621.395.63

REGISTER SIGNALLING IN THE CZECHOSLOVAK TELEPHONE SYSTEMS

Prague SLABOPROUDY OBZOR in Czech Vol 39 No 3, Mar 78 pp 105-111

VINCALEK, VACLAV, engineer, TESLA Karlin, National Enterprise, Prague

[Abstract] The article describes the method by which register signalling with a tied information transfer is used in Czechoslovak switch-boards. The register signals used comply with the recommendations of the international organization CCITT [International Consultative Committee for Telephone and Telegraph] and also with the specific needs of the Czechoslovak telecommunications network. The designation of the Czechoslovak system is R2. As a result of the introduction of these systems it was possible to convert the Czechoslovak telephone network to full automatization with respect to both local and long distance calls. The frequencies for forward signals are 1380, 1500, 160, 1740, 1860 and 1980 Hz. For backward signals the frequencies are 1140, 1020, 900, 780 and 660 Hz. Figures 7; tables 7; references 2: 1 Czech, 1 Western.

USSR

UDC 621.396

THE NOISE IMMUNITY OF BINARY SIGNAL RECEPTION IN A MULTIBEAM CHANNEL, WHERE ERRORS EXIST IN THE MEASUREMENT OF THE CHANNEL PARAMETERS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 106-108
manuscript received 27 May 76

GORYAINOV, V. T. and STETSYUK, M. A.

[Abstract] An optimum algorithm derived in the literature for the reception of binary signals in a multibeam channel with the absence of intersymbol interference reduces to the differentiation of two signals with known mean values and correlation functions. Under certain conditions, these signals take the form of a normal random process. This assumption is also made in the present analysis of the operation of a binary communications system. The quality criterion is the overall error probability in the reception of a binary symbol. The case of phase keying is analyzed, and the expressions derived permit an estimate of the noise immunity of binary signal reception in the absence of intersymbol interference. If the channel parameters are measured by means of special test signal probes, then the power of the latter necessary to assure that the errors in channel parameter estimation have practically no influence on the reception noise immunity can be determined. References 4: 3 Russian, 1 Western.

USSR

UDC 621.396.23

NOISE IMMUNITY OF RECEPTION IN SHORTWAVE CHANNELS WITH FREQUENCY ADAPTATION

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 45-47 manuscript received 10 May 77 after completion

KAGAN, B. D., KOVROV, S. S. and PETROV, A. D.

[Abstract] Two types of algorithms of a frequency-adaptive shortwave radio communications channel are considered, assuming that a group of n frequencies is generated for adaptation. The probability distribution functions for erroneous reception of a symbol in an adaptive radio channel are presented for both types of algorithms. A procedure for calculating the given distribution functions is proposed for shortwave channels subjected to lumped interference. Curves are presented which characterize the variation of the minimum number of adaptation frequencies required in order to ensure given reliabilities as a function of the reliability of reception in the corresponding channel without adaptation. Figures 2; references 4 (Russian).

YUGOSLAVIA

UDC 621.396.43

ANALYSIS OF RELIABILITY OF FM400 RADIO RELAY EQUIPMENT USING FIELD DATA

Ljubljana ELEKTROTECHNICKI VESNIK in Serbo-Croatian No 4, 1977 pp 241-244
manuscript received 19 Jul 77

HUDOKLIN, ALENKA, mag. fiz. and OZBALT, SLAVKO, dipl. eng., The ISKRA Institute for Transmission Technology, Ljubljana

[Abstract] The radio relay equipment tested was the ISKRA product FM400, an unmanned relay for transmission of 24-60 telephone channels in the frequencies of 370-430 MHz. These relays are portable and may be used without special weather or physical protection. The test group of 17 units was produced in a single series. The projected reliability of components, and actual results in operations with respect to the cause of failure of units in use by civil aviation, the electric power industry, and the communications network, are presented. Quantitative analysis of the data obtained indicates that the FM400 units functioned with greater reliability than was projected. The most frequent failures could be traced to demodulators and synchro oscillators; as anticipated by projections, these problems were caused by transistors in the components. Tables 5; references 4 (Serbo-Croatian).

USSR

UDC 621.396.6

CONCERNING THE OPTIMUM RELATION BETWEEN TUNING TIME AND COMPLEXITY OF SELECTIVE EQUIPMENT WITH AUTOMATIC TUNING

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 65-67 manuscript received after completion 4 May 77

KALUZHSKIY, A. D.

[Abstract] One of the most widely used high-speed elements for automatic tuning of communications equipment is the discrete variable capacitor (DVC). The various circuits used for tuning have different speeds, and the speed and complexity requirements are contradictory. In this paper a solution is proposed for the problem of striking a compromise between short tuning times and circuit complexity. Formalization of the solution is based on the theory of optimum design of communication systems. The technical specifications are optimized with respect to a criterion functional that accounts for external parameters, and an equation is derived relating external and internal parameters. Mathematical programming is used to calculate the optimum tuning time and complexity. Figures 2; references 5 (Russian).

YUGOSLAVIA

UDC 621.396.61.029.6

THE UHF MOBILE RADIO SET UKM8-07SSd

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian No 4, 1977 pp 246-250
manuscript received 21 Apr 77

ZAKRAJSEK, STANE, Institute for Transmission Technology, Ljubljana

[Abstract] The UKM8-07SSd mobile radio set, which works on frequencies of 430-470 MHz in either simplex or semiduplex communications systems, or in combinations, is discussed in terms of applications where distances are not great and high frequencies and low antennas can be used. The mobile radio components of a receiver with demodulator, transmitter with modulator, channel oscillator and automatic relays, are diagrammed and described. Technical data are presented, and the conclusion reached that the mobile radio set is very suitable for field work. It is a product of ISKRA research and development. Figures 10.

QUASI-OPTICAL POLARIZATION INTERFEROMETERS FOR THE MIXERS OF MILLIMETER AND SUBMILLIMETER WAVELENGTH RECEIVERS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 35-41
manuscript received 16 Jul 76

YANOVSKIY, M. S. and KNYAZ'KOV, B. N.

[Abstract] Mach-Zender interferometers, where the beam path is equal to half of the intermediate frequency wavelength, are used in superheterodyne radiometers for millimeter and submillimeter wavelengths. A considerable expansion of the range of frequencies in which the interferometer operates, as well as a simplification of its design, are achieved through the use of polarization interferometers based on a quasi-optical transmission line, unidimensional wire lattices and angular rotators for the plane of polarization of the reflected wave. The basic device is a dual channel polarization interferometer, designed around an adjustable beam splitter; the interferometer uses a circular cross-section dielectric lightguide working in the EH_{11} mode, with a wave that has a practically flat phase front and an axially symmetric amplitude distribution of the field intensity, which falls off towards the periphery in accordance with a Bessel function. The wire lattices have a ratio of wire diameter to spacing within limits of 0.15-0.3, where the spacing is 0.05 times the wavelength. The reflection factor for an E-polarized wave for lattices of tungsten wire 8 micrometers in diameter spaced 40 micrometers apart in the 0.5 - 2.0 mm range is more than 0.99, while the transmittance for H polarization is practically unity. Three polarization interferometer configurations for mixers are analyzed, and expressions are derived for the heterodyne and signal power transmittance, the heterodyne noise, as well as the heterodyne suppression of the mixers and the bandwidths of the polarization interferometers. The interferometers use a hollow, dielectric lightguide with an inner diameter of 20 mm, the attenuation of which is 0.7 - 8 dB/m in the 0.5 - 2 mm band. It is recommended that the interferometers be used for intermediate frequencies above 300 MHz in the shortwave section of this 0.5 - 2 mm range, and above 600 MHz in the longwave section. Figures 6; references 7 (Russian).

FINE-TUNING EFFECTS OF PHASE AUTOMATIC SLOPE CONTROL CIRCUITS AND DETERMINATION OF THE OPTIMUM DELAY TIME OF A STANDARD DELAY LINE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 83-88
manuscript received 21 Feb 77; after revision 21 Sep 77

CHIRKOV, G. V. and YELFIMOV, V. I.

[Abstract] The authors consider the phase automatic slope control (FAPK) circuit. This is a system in which the modulation law is automatically adjusted by using a master delay line for preprocessing the square law of variation in the phase of the initial waveform, with linear frequency modulation resulting in conversion to a linear law, and then using conventional phase AFC circuit elements. Engineering formulas are found for the filtration coefficient and optimum delay time of the master line in FAPK circuits with two kinds of discriminators (an analog frequency or phase detector, and a pulse phase detector), two kinds of pulse phase detector output circuits and various correcting filters. The results of theoretical analysis show that in order to maximize the fine-tuning action of automatic linearity control systems with analog discriminating elements it is necessary to find a compromise between the actual lag of the discriminating element and the delay time of the master delay line. For all the FAPK circuits investigated, the optimum delay time is close to the value determined by the time rate of change in frequency ($T_{opt} \approx \sqrt{2\pi/V_0}$, where $V_0 = d\omega/dt$ is the slope of the frequency curve), and the fine-tuning action of the circuit depends on the signal base: the fine-tuning action is proportional to the square root of the base for a circuit with first-order astaticism, and is proportional to the base for a circuit with second-order astaticism. Figures 4; references 4: 3 Russian, 1 Western.

USSR

UDC 621.396.93

CORRELATION OF INTERFERING SIGNALS IN MULTIBEAM RECEPTION

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 73-76

GOLOVIN, E. S.

[Abstract] An analysis is made of the interference immunity of data transmission systems with multibeam reception. The functions of spatial correlation of fields are derived for mobile radio systems in the case of three-dimensional models of lobe-switched signal propagation, assuming two models for the arrangement of the re-radiators and re-reflectors--uniform and localized placement on a hemisphere. Figures 3; references 3: 1 Russian, 2 Western.

USSR

UDC 621.396.94

SHAPING ANALYZING SIGNALS FOR INVESTIGATION OF COSMIC PLASMA

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 75-77 manuscript received 28 Dec 77

KRISILOV, YU. D.

[Abstract] Two versions of devices with amplitude adjustment and stabilization which were designed in order to shape the analyzing signals in instruments for studying the cosmic plasma were investigated with respect to static and dynamic indexes. The primary difficulty in building these devices is to obtain stabilization coefficients and stability of margins. The stability can be increased by using a linear correction. Expressions are derived to resolve these difficulties. These expressions can be used for the selection of the parameters of the elements of the devices in order to obtain the required precision, dynamic range and stability of the analyzing signals in the charged particle spectrometers installed on the equipment of the Mars, Venus and Prognoz [Forecast] series. Figures 1; references 6: 5 Russian, 1 Western.

USSR

UDC 621.396.94

IMPROVING THE SENSITIVITY OF LOW-FREQUENCY AMPLIFIERS USED TO MEASURE THE
PARAMETERS OF THE INTERPLANETARY PLASMA BY THE MODULATION METHOD

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 78-79 manuscript received
29 Dec 77

YEMEL'YANOV, S. L., STARTSEV, V. I. and SOKOLOV, V. G.

[Abstract] Relations are derived which formulate the requirements on radio electronic equipment designed to measure the energy spectrum of the interplanetary plasma, realizing a meter sensitivity of 10^{-13} amps for a signal-to-noise ratio of one with instability of the conversion coefficient of the plasma flux of no more than one percent.

The sensitivity of the plasma parameter meters is improved by the modulation method. Various factors are determined which lower the sensitivity and precision of the measurements. Figures 3; references 5 (Russian).

USSR

UDC 621.396.94

PECULIARITIES OF ULTRASHORT WAVE PROPAGATION THROUGH A SOLAR PLASMA DURING
RADIO COMMUNICATIONS WITH THE VENERA-10 [VENUS-10] SPACECRAFT

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 96-98 manuscript received
9 Jan 78

YAKOVLEV, O. I., MOLOTOV, YE. P., YEFIMOV, A. I., POGAL'SKIY, V. I.,
RASMANOV, V. M., SHNYGIN, YU. N. and SHTRYKOV, V. K.

[Abstract] The experimental data on the effect of the solar plasma on the propagation of decimeter ($\lambda = 32$ cm) radio waves between Venus-10 and the earth are discussed from the point of view of radiotechnical application, with the satellite at various distances from the sun, with spacing between the source of the radio signals and the observation point varying within the limits of 240 to 260 million km, and with the angular distance between the spacecraft and the center of the sun varying from 15 degrees to 0.6 degrees.

The broadening of the spectral line and decrease in the response of the narrow band receiver, and the frequency and amplitude fluctuations of the radio waves are analyzed. The fluctuations of the field and frequency intensity and broadening of the spectral line are basically determined by the angular distance between the spacecraft and the sun, and the observed phenomena were significant for radio communications in the angular range of ± 10 degrees.

They characterize the communication conditions with spacecraft in the decimeter band with minimum solar activity. The fluctuation effects in the solar plasma can be appreciably greater during maximum solar activity. The data can also be used to determine the solar wind velocity and parameters of the solar plasma inhomogeneities. Figures 3; references 5 (Russian).

USSR

UDC 621.396.96

DETECTION OF PULSE SIGNALS AGAINST A BACKGROUND OF UNSTEADY INTERFERENCE WITH UNKNOWN CORRELATION PROPERTIES

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 80-82 manuscript received 8 Jun 77; after abridgment 14 Dec 77

BARTENEV, V. G. and SHLOMA, A. M.

[Abstract] The authors consider synthesis of a detector of pulse signals against a background of normal interference that is nonstationary with respect to range with unknown correlation properties. An algorithm for simplified technical realization of the system is proposed which is based on a modification of a T^2 -statistic. This algorithm implies that the operation of the detector varies as a function of the evaluation of the correlation properties of interference with respect to each range sample. Adaptation takes place with respect to both the modulus and the argument of the interperiod correlation coefficient, thus automatically compensating the correlated formations with Doppler shift of the spectrum. Figures 2; references 3 (Russian).

USSR

UDC 621.396.97

ON IMPROVING THE QUALITY OF RADIO BROADCASTING

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 10-15 manuscript received after completion 20 Feb 77

BUKHOVNER, V. YE.

[Abstract] A compatible system is proposed for improving the quality of radio broadcasting. On the transmitting end, a delay unit is connected in series to the transmitter input. In parallel with this series circuit, an envelope detector is connected in series to the modulator input of a frequency synthesizer. On the reception end, a standard receiver has an additional (frequency conversion) output connected to the input of an envelope demodulator, which is connected in turn to the controlling input of a compander. The signal input of the compander is connected to the receiver output, and the compander output goes to the loudspeaker. The broadcast program can also be received by standard equipment, but broadcasting reception is improved only for those that are equipped with a compander attachment to receive the control signal. Companding effectiveness is analyzed, and the main parameters of the radio compander are calculated. The author thanks I. Ye. Goron for interest in the work and constructive criticism. Figures 4; references 11: 9 Russian, 2 Western.

USSR

UDC 621.396.518.5

PROBABILITY SIMULATION OF THE PROCESS OF PHOTODETECTION AS APPLIED TO OPTICAL COMMUNICATION LINES

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 101-103 manuscript received 5 Apr 77

OGANESYAN, A. V.

[Abstract] The process of recording weak emission by a photodetector operating in the photon counting mode under the effects of limited shot noise was simulated. The photoelectron flux at the output of the photodetector was caused by incident coherent radiation, background emission of the environment and the shot noise of the photodetector. The presence of multiplicative and additive noise in the optical communications line was considered. The simulation process was accelerated by considering the correlation properties of the additive noise and the specific nature of distribution of the number of photoelectrons. With high significance levels the theoretical and experimental distributions correspond to each other, indicating high precision of

the simulation process. Increasing the probability of appearance of a photo-electron results in acceleration of the simulation process but it implies a decrease in precision, inasmuch as the proton-photodetector simulation model corresponds essentially to a binomial counter. Tables 1; references 7: 5 Russian, 2 Western.

HUNGARY

FIBER-OPTICAL SYSTEMS IN ELECTRONICS. PART 2

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 17 No 5, May 78 pp 133-136

SZALAY, MIKLOS, dr, engineering and economics consultant, Central Research Institute of Physics

[Abstract] This part of a series of articles discusses optical connectors and connecting methods on the basis of references in the literature. The primary design consideration for connectors is to reduce the photoelectric current loss to a minimum. Maximum transmission efficiency is obtained if the areas of the radiating surface and the input surface of the optical fiber are identical, and the angle of aperture is as small as possible. One way to reduce the input surface of the optical-fiber bundles (which is usually too large) is to squeeze them into a circular cross section. The three major design principles for optical connectors are (1) metal connectors secured with epoxy adhesive (Amphenol system), (2) plastic connectors secured with epoxy adhesive (AMP system), and (3) metal connector of several parts secured with molten glass (ITT Cannon system). In all three, the connection attenuation is less than 2 dB and all permit cable-cable and cable-solid state device connections to be made. The literature describes numerous devices and tools for making the connections. The method for cutting the optical cables to obtain clean ends (which do not cause non-uniform voltage distribution within the fibers) is critical for optimum joints. The connectors are filled with air, molten glass, glycerol or similar material to create an environment with a refraction index close to that of the optical fibers. Figures 7; tables 1; references 11 (Western).

USSR

RANGE OF RADIO COMMUNICATION WITH MOVING OBJECTS IN THE METER WAVE BAND

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 5, May 78 pp 36-37

[Abstract] Curves are given based on CCIR [International Radio Consultive Committee] recommendations for determining the range as a function of field strength for different antenna heights in communications between a central base station and mobile stations in the 150 MHz and 40 MHz bands. A nomogram is provided for scaling to powers up to 100 W. Figures 4; tables 1.

USSR

UDC 656.254.16:621.396.4

A TWO-WIRE LINE ON THE METER WAVE BAND FOR RADIOCOMMUNICATION IN TUNNELS

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 5, May 78 pp 22-25

SHEVCHUK, R. M., docent, OMIIT [expansion not known], candidate in physical and mathematical sciences [deceased]; NIKITIN, V. I., docent, candidate in technical sciences, SHIBAYEV, V. M., senior electrician, Input Range of West Siberian Railroad

[Abstract] An investigation is made of the attenuation factor of directional systems for radio communications in the 150-156 MHz band between ZhR-U-SP and ZhR-U-LP stations on trains in tunnels. The influence of various electrical and geometric parameters on the attenuation factor is analyzed. It is shown that meter waves can be channeled under these conditions by a very simple directional system--a two-wire line with spacing of the order of a few centimeters between wires. This system concentrates the electric field close to the wires and attenuates the influence of the tunnel walls, nearby wires and rolling stock. Figures 6; tables 1.

USSR

UDC 656.254.16:621.396.931

EQUIPMENT FOR A NEW TRAIN RADIOCOMMUNICATION SYSTEM

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 5, May 78 pp 3-8

MALYAVKO, V. YE., chief engineer of the design bureau of the Main Administration of Signaling and Communications, Ministry of Railways; BLINDER, I. D., chief, Division of Radiocommunications, and ANPILOV, M. V., chief designer

[Abstract] A new system for radiocommunications on trains has been developed for the 150 MHz wave band based on the ZhRU radio station. The station equipment of the new system includes a control office with a dispatcher call board, ZhR-UK-SP base stations, PU4D adapters, TU-RS devices for AF control of radio stations, BUP units for DC control and OUDU duplex amplifier bypass devices. The call board provides centralized communication between the dispatcher and train engineers. The PU4D adapter is a four-wire termination set that connects all simplex communications to telephone channels. The TU-RS control units receive an AF control signal and shield the voice channels from simultaneously transmitted audio control frequencies. The BUP units transmit DC voltage for control of the simplex base stations. The OUDU device provides a bypass circuit for direct current on lines with PTDU-M duplex amplifiers. The article gives block diagrams of the various components of the system and explains their operation and interaction. Figures 6.

USSR

USING RF MULTIPLEX CHANNEL FOR DATA TRANSMISSION FROM SEVERAL POINTS

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 5, May 78 pp 32-33

FILATOV, YU. A., senior engineer, laboratory of the Belorussian Railroad, and BEZHUK, V. M., senior electrician

[Abstract] The current system used for data transmission on the Belorussian Railway involves sending telegraph signals from the loading station to a junction center, and then via the Akkord-1200 unit to the computing center over rf channels. Heavy traffic has required the installation of two Akkord units and the use of two rf channels. The authors describe a system in which one rf channel can be used sequentially by two Akkord-1200 equipment complexes. Interlocking relays are used to free one channel and block the other while simultaneously transmitting a busy-channel signal to the blocked station. Figures 3.

Components and Circuit Elements Including
Waveguides and Cavity Resonators

USSR

UDC 621.311.6.072.2

PULSED SECONDARY POWER SUPPLY STRUCTURES WHICH KEEP IMPEDANCE CONSTANT AT
HIGH EFFICIENCY

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 116-119
manuscript received 1 Nov 76; after revision 11 Apr 77

KNYAZEY, A. P., REZNIKOV, O. B., BOCHAROV, V. V., CHORBA, V. R. and
LOMONOSOV, L. YE.

[Abstract] An analysis is made of a pulsed secondary power supply (IIVP) with an intermediate accumulator connected in series or in parallel to feed pulsed loads from a primary source of limited power. Equivalent circuits, time diagrams and systems of equations of working conditions are presented for structures with both series and parallel intermediate accumulators. Realization of a quasi-optimum intermediate accumulator of parallel type is most easily realized by using a storage battery or large capacitor, while the series type is best realized by using a high-inductance choke. Because of mass and efficiency considerations, it is advisable to use an inductive accumulator in relatively high-frequency pulse circuits, and a capacitive accumulator in low-frequency circuits or where the pause is long. A mixed circuit can be used in which the difference between input and output powers is integrated in an inductive accumulator while the reservoir supply capacitor is being charged, and the capacitive accumulator is then charged through the inductive accumulator during the pause. Figures 2; references 2 (Russian).

USSR

UDC 621.318.134.029.64

NONRECIPROCAL SUBMILLIMETER-BAND FERRITE DEVICES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 875-877 manuscript received 31 Jan 77

KRAFTMAKHER, G. A. and MERIAKRI, V. V.

[Abstract] Quasi-optical nonreciprocal devices for the submillimeter band were built on the basis of the type 10Sch6 ferrites at a wavelength of $\lambda = 0.8$ mm with losses of 0.43 decibel/mm and the 10SchB ferrites with losses of 0.2 decibels/mm. The nonreciprocal ferrite devices investigated included a circulator in which the Faraday rotation increased as a result of interference beats in the unmatched sample and a traveling wave valve. The parameters of these devices are presented in the form of graphs. The four-period lattices used have a period of 40 to 30 microns and a conductor diameter of 8 microns. They provide damping of the electromagnetic wave with

polarization parallel to the conductors on the order of 20 to 25 decibels in the 0.8 to 2 mm range. The authors thank S. G. Abarenkov and Ye. M. Kobetz for courteously making available ferrite specimens and ferriterings. They are grateful to A. M. Markevich and N. A. Kleymenov for assistance in creation of coatings. Figures 3; references 7: 4 Russian, 3 Western.

USSR

UDC 621.372.2

ELECTROMAGNETIC EMITTERS IN A DIELECTRIC SHELL OF CYLINDRICAL SHAPE

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 45-48 manuscript received 3 Jan 77

DRABKIN, A. L., KRASIL'NIKOVA, V. A. and DRABKIN, S. R.

[Abstract] In order to reduce the resistance of small antenna wires it is sometimes advisable to place them in vessels filled with liquefied gas at low temperatures. In such cases it is necessary to account for the additional losses in the walls of these vessels. A method is proposed in this paper for determining the efficiency of an electrical dipole and a frame placed inside a cylindrical shell made of a dielectric with electrical parameters corresponding approximately to those of glass. The dimensions of the shell are taken as small compared with a wavelength. Expressions are derived for frames with the loop parallel to and perpendicular to the cylinder axis. It is found that the efficiency of a frame radiator is somewhat lower when the axis of the loop coincides with the axis of the cylinder. It is shown that the efficiency of radiators in a cylindrical shell is somewhat greater than in the case of a spherical shell if the height of the cylinder is greater than the diameter of the sphere for shells of equal diameter. The paper was presented on 13 January 1975 at the Section of Theoretical Radio Engineering, Leningrad Branch of NTORES [Scientific-Technical Society of Radio Engineering, Electronics and Communications] imeni A. S. Popov. Figures 4; reference 1 (Russian).

USSR

UDC 621.372.543.2

A PARAMETRIC FILTER WITH CAPACITOR COMMUTATION AND PROVISIONS FOR SIGNAL SPECTRUM TRANSFER

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 24-31 manuscript received 2 Jan 77

TARBAYEV, S. I.

[Abstract] An analysis is made of a parametric filter which has provisions for commutation of capacitors and for shifting the spectrum of the filtered signal by an arbitrary distance along the frequency axis. An exact expression is derived for the transfer function of the filter. Among the advantages of this filter is the possibility of stabilizing the average passband frequency, electric control over wide ranges of average frequency and passband width, and the fact that the filtered signal spectrum can be shifted arbitrarily. A disadvantage of the circuit, as with other parametric filters, is that certain undesirable components arise at the output because of non-ideality of the actual circuit elements. However, in many cases, the low amplitude of these components in the given type of filter does not hinder applications. In particular, experimental tests have shown that filters of this kind have good prospects for use in low-speed discrete data transmission. The circuit is based on RC tanks and can be integrated. Figures 5; references 9: 3 Russian, 6 Western.

USSR

UDC 621.372.822

RADIATION FROM A RECTANGULAR WAVEGUIDE APERTURE INTO A LOSSY DIELECTRIC HALF-SPACE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 42-45 manuscript received 25 Jun 76; after completion 31 Jan 77

PARVATOV, G. N. and POPOV, A. A.

[Abstract] While the problem of radiation from a flat waveguide into a lossless dielectric medium has been solved by a sewing procedure using a discontinuous Schaftheitlin integral, the results cannot be applied to cases of practical importance without additional work. For this reason, the diffraction problem for a rectangular waveguide is solved, where a lossy dielectric half-space is contiguous to the aperture of the waveguide. The solution is reached using scattering matrices for the single wave mode in two cases: a) A flangeless waveguide; b) A waveguide with infinite flanges. A method is given for calculating the reflection factor for these cases; the proposed

procedure can be used for the majority of open radiating systems in determining the influence of impedance media on the field distribution in waveguides of various cross-sections. Figures 2; references 5: 4 Russian, 1 Western.

USSR

UDC 621.372.823.3

EXPERIMENTAL CONFIRMATION OF THE EXISTENCE OF COMPLEX WAVES IN A SHIELDED TWO-LAYER CIRCULAR WAVEGUIDE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 699-702 manuscript received 28 Feb 77

KALMYK, V. A., RAYEVSKIY, S. B. and UGRYUMOV, V. P.

[Abstract] An experimental study was made of complex waves on a model of a shielded two-layer circular waveguide. The results of measuring the phase constants and the damping coefficients of the complex waves confirm their existence. The tabulated data show that the limiting value of the phase constants corresponding to the transition to an ordinary propagated HE_{11} wave compares with the calculated with a precision of no less than 5 percent. The waves have a longitudinal dependence of the field coinciding with the field described in previous papers, and propagation constants numerically similar to the previously calculated ones. In the experimental system described when the dielectric rod together with the exciter and absorber is displaced relative to the receiver, the field is undisturbed in the investigated region of the two-layer waveguide. Figures 2; tables 1; references 9: 8 Russian, 1 Western.

USSR

UDC 621.374.4.001.5

TRANSMISSION OF MODULATED OSCILLATIONS THROUGH VARACTOR FREQUENCY MULTIPLIERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 771-778 manuscript received 5 Jan 77

MOGILEVSKAYA, L. YA., POLESHCHUK, V. A., PEKELIS, M. A. and KHOMUNTSEV, YU. L.

[Abstract] The principle of representation of a nonlinear system (a varactor multiplier) has a system with variable parameters for small modulation indexes which is used to investigate the problem of the transmission of modulated signals through varactor frequency multipliers. The basic relations for analyzing the transmission of the modulated oscillations through the multiplier are analyzed, and the results of calculating the modulation characteristics of varactor frequency multipliers are plotted on graphs showing the AM and FM signal indexes in a wide frequency range. The results of analyzing the amplitude-phase conversion agree with the previous experimental investigations. Figures 4; references 7: 4 Russian, 3 Western.

USSR

UDC 621.391.82

INVESTIGATION OF DYNAMIC CHARACTERISTICS AND INTERFERENCE IMMUNITY OF INTEGRATORS WITH MEMORY FEEDBACK

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 5, 1978 pp 90-94 manuscript received 24 May 77

POPOV, V. S. and RUBAN, N. G.

[Abstract] An examination is made of the dynamic characteristics and interference immunity of an integrator based on an opamp with a capacitor in the feedback circuit. Two identical dynamic memory devices are connected to the output of the integrator. The first contains switches, a storage capacitor and an opamp connected in a follower circuit; the second contains corresponding switches, a capacitor and an opamp. Buffer amplifiers decouple the integrator unit from the dynamic memory devices. In the general case the input voltage to the integrator contains constant and harmonic components. A period-isolating device shapes switch controlling pulses from the input signal. The duration of these control pulses is equal to the period of the fundamental of the input voltage. It is shown that a circuit of this kind is a high-speed averaging device that can be used as a high-speed low-frequency filter, or for protecting digital voltmeters from periodic interference. The paper was recommended by the Department of Data-Measuring Techniques, Moscow Power Engineering Institute. Figures 2; references 4: 3 Russian, 1 Western.

POLAND

UDC 621.392

VOLTAGE CONTROLLED TESLA SN 150 10 GYRATORS AND THEIR APPLICATIONS

Warsaw ELEKTRONIKA in Polish Vol 18 No 9, 1977 pp 360-363

MOOS, PETER and MARTINEK, PRAVOSLAV, Department of Electrical Engineering,
Higher Technical School, Prague, Czechoslovakia

[Abstract] The properties are described of a voltage-controlled TESLA SN 150 10 quadrupole (gyrator) which may be used as a voltage-controlled inductance or as an element tuned by external control voltage. It may be applied without compensation in a band up to 30 kHz, and with compensation can be used in higher frequency ranges up to 100 kHz. Figures 12; references 5 (Czech).

USSR

UDC 621.396.96

THE COMPLEX SYMMETRY OF THE WEIGHTING COEFFICIENTS OF A MULTIDIMENSIONAL ADAPTIVE FILTER

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 115-117 manuscript received 29 Jun 76; after completion 13 Dec 76

VASILEVICH, L. F. and VINOGRADOV, N. A.

[Abstract] An expression, taken from the literature on adaptive antenna arrays, is given for the parameters of adaptive filters. Troughs in the spatial amplitude characteristic of the filter can be produced through the choice of the weighting coefficients. In this case, the signal-to-noise ratio at the filter output is a maximum. The optimality criteria can differ, and for example, can be a minimum of the mean square error. The number of elements in the matrix of weighting coefficients is usually large, and thus the autotuning network of an adaptive filter is extremely complex. It is necessary to store a large volume of data in order to fine tune the filter. This requirement can be reduced, however, if the property that the weighting coefficients are complex conjugates is utilized. This property consists in the symmetry of the real, and the asymmetry of the imaginary parts of the weighting coefficients; using this property makes it possible to half the size of the autotuning circuit and increasing adaptive filter efficiency. The proof is demonstrated for simple signals and a generalization to complex signals can be based on the analogy between spatial (complex directional characteristic) and frequency (transverse) filters. The proof is good only for identical white noise powers in the channels of a spatial filter. Otherwise, when referencing the noise to the filter input, the spatial correlation matrix of the noise is asymmetrical, which produces asymmetry in the weighting coefficients of the filters. However, this asymmetry can be disregarded if the power of the external interference exceeds the noise power by 20 to 30 dB, as simulation shows. References 2 (Russian).

POLAND

UDC 666.31.7:621.38

TYPE PLZT ELECTROOPTIC CERAMICS

Warsaw ELEKTRONIKA in Polish Vol 18 No 12, 1977 pp 481-485

HARASIEWICZ, KATARZYNA ANNA, Institute of Electronic Technology, Warsaw Polytechnic

[Abstract] The physical, electrical and optical properties of type PLZT ferroelectric ceramics are described. Its production technology, present methods, and development trends are discussed. Figures 7; references 16 (Western).

USSR

UDC 681.7.068

RAY CALCULATION OF THE EXCITATION OF A MULTIMODE OPTICAL FIBER

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 711-717 manuscript received 20 Jul 77

POTAPOV, V. T., SOKOLOVSKIY, A. A. and SHATROV, A. D.

[Abstract] A study is made of the ray method of calculating the excitation efficiency of multimode fibers as applied to derivation of analytical expressions for the efficiency of exciting a two-layer fiber by a Lambert source where the source is located at an arbitrary distance from the end of the fiber. The analytical expressions are found for the matching efficiency as a function of a variety of source radii. Good agreement was found between the results obtained using the derived expressions and the numerical calculations considering both surface and tunneling modes, which leads to the conclusion that the calculations considering only the power transported by the surface modes are valid. The authors thank B. Z. Katsenelenbaum and R. F. Matveyev for useful discussion. Figures 2; references 10: 3 Russian, 7 Western.

USSR

UDC 681.84.083.51.8

ANALYSIS OF THE DISPERSION FIELDS OF MAGNETIC HEADS BY MOIRE AND SCHLIERING ELECTRON MICROSCOPE PATTERNS

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 35-39 manuscript received 6 Jan 77

KHALETSKIY, M. B. and RAY, E. I.

[Abstract] The shape and size of the dispersion fields of magnetic heads are determined by optoelectronic sounding by a raster electron microscope. The moire and schliering patterns obtained make it possible to study the spatial distribution of the fields with good sensitivity on the order of 10^{-4} tesla and high resolution of fractions of a micron.

The figures comparing the moire patterns and schliering patterns indicate that even with low magnetomotive forces the magnetic circuit of the magnetic heads is partially saturated in the vicinity of the working gap. The moire patterns obtained on models with a priori given possible variation of the configuration of the operating surface of a magnetic head can be used to estimate the causes of anomalous distribution of real dispersion fields of the heads. Figures 5; references 9: 7 Russian, 2 Western.

EAST GERMANY

DESIGN DOCUMENTATION FOR MULTILAYER CIRCUIT BOARDS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 4, Apr 78 pp 222-225

REUTHER, ARMIN, engineer, Contact Components and Special Machinery Construction State Enterprise, Gornsdorf

[Abstract] The article defines single-layer circuit boards, two-layer circuit boards with through contacts, circuit boards with embedded conductor strips, flexible circuit boards, and multilayer circuit boards. It points out the advantages and describes the design principles of the multilayer circuit boards. The following documentation is required for the manufacture of multilayer circuit boards: original wiring diagrams, schematic diagrams, fabrication drawings No 1 and 2, check film, test punched card, checklist, drilled-hole strip, assembly instruction, and list of construction documents. East-German Standards (TGL) cover the content and format of these documents; the article describes the major provisions of the various applicable standards. The various layers are identified by numbers and/or letters; the size, location, and structure of the identification is also standardized. The purpose of these standards is to facilitate smooth cooperation between manufacturer and user in order to ensure that ultimately the most suitable multilayer circuit boards are made for the intended use. Four-layer and six-layer circuit boards are the most often used multilayer circuit boards. Figures 12; tables 2; references 2 (German).

UDC 621.314

USSR

ALGORITHMS OF DIGITAL COMPUTER ANALYSIS OF TRANSIENT AND STEADY-STATE PROCESSES IN THYRISTOR FREQUENCY CONVERTERS WITH ANTIPARALLEL DIODES

Minsk IZV. VUZ: ENERGETIKA in Russian No 3, Mar 78 pp 56-60 manuscript received 10 Jun 77

SABANEYEVA, G. I., candidate of technical sciences, docent; KOSTYUKOVA, L. P., engineer, and RYBENKOVA, O. N., engineer

[Abstract] A detailed analysis is made of algorithm for M-222 digital computer calculation of multiple-bridge thyristor inverters with antiparallel diodes used in induction heating. Algorithms are compared which are based on piecewise-linear approximation of diode characteristics and which differ in the selection of substitution circuits and the method of forming the mathematical model. The systems of differential equations are solved by numerical integration using the Runge-Kutta method. The analysis shows that a model with variable structure has appreciable advantages for circuits that contain like modules of variable structure with a small number of commutation situations. On the other hand a model with a fixed structure with a resistive-inductive diode substitution circuit is most effective for circuits that do not contain standard modules. The paper was presented by the Department of the Theoretical Basis of of Electrical Engineering, Ufa Aviation Institute. Figures 3; references 4 (Russian).

USSR

UDC 621.372.852.2:621.382

ESTIMATION OF THE SPEED OF DISCRETE PHASE SHIFTERS BASED ON FREQUENCY MULTIPLIERS WITH OPPOSING DIODES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 139-141 manuscript received 30 Mar 77

CHUDAKOVA, A. A. and SHKALIKOV, V. N.

[Abstract] An estimation is made of the duration of transient processes in discrete phase inverters based on frequency multipliers with opposing diodes. The transient processes which determine the speed of the phase shifter are divided into four groups: 1) Passage of the video pulse through the low-frequency filter at the control input; 2) Change in bias voltage across the diodes; 3) Generation of waveforms in the output circuit when the phase of the output signals is switched; and 4) Passage of the radio pulse through the bandpass filter in the multiplier output circuit. It is shown that the duration of the transient processes in the decimeter waveband can be kept

within a few nanoseconds by proper selection of the order of multiplication, and the parameters of the diode and the output bandpass filter. Figure 1; references 5 (Russian).

USSR

UDC 621.382.233.026.027.3.015.3

COMPARISON OF CIRCUITS FOR DAMPING HIGH-FREQUENCY VOLTAGE FLUCTUATIONS IN HIGH-VOLTAGE CONVERTER VALVE SWITCHING

Moscow ELEKTRICHESTVO in Russian No 5, May 78 pp 50-56 manuscript received 31 May 77

NAKHODKINA, V. G., engineer, TARASOV, A. N., engineer, and TOLSTOV, YU. G., doctor in technical sciences. Power Engineering Institute imeni G. M. Krzhizhanovskiy

[Abstract] Methods of mathematical modeling on a digital computer are used to analyze the damping of high-frequency oscillations of the anode voltage across a thyristor valve which arises during current commutation in three-phase bridge converters. The most extensively used damping circuits are considered. The impact coefficients of voltage across the valve and the power losses in the resistors are compared. It is shown that delta connection of the damping circuits enables the use of smaller capacitors than parallel connection of damping circuits with the same parameters. However, the total losses of power in the resistors are higher with delta connection, so that the two types of circuits are practically equivalent. Figures 5; references 8: 6 Russian, 2 Western.

USSR

UDC 621.315.2.05:537.321.62

EVALUATION OF ECONOMY IN THE USE OF SUPERCONDUCTIVE ELECTRIC POWER TRANSMISSION LINES WITH POROUS CURRENT CARRIERS

Minsk IZV. VUZ: ENERGETIKA in Russian No 5, May 78 pp 109-113 manuscript received 12 Aug 77

BELYANCHEV, YU. V., candidate in technical sciences, and MORGUN, V. A., engineer.

[Abstract] The paper is concerned with technical-economic analysis of low-temperature power transmission cables based on porous materials. A three-phase superconductive line is considered with shielding by phases. Each phase is made permeable in the radial direction by using braided superconductors over perforated aluminum tubing. The insulation is a dielectric tape of fiberglass, mylar or the like. Closed circulation is used for the main and intermediate coolants. Forward flow is through the channel of the central tubing and the casing-tubing annulus. Separate tubes are used for return flow. Cable designs with porous and nonporous semiconductors of identical materials are compared. A technique is proposed for calculating optimum coolant flowrates, and it is shown that the specific cost indices of power transmission can be reduced by using porous current carriers and organizing suction through the walls. It is shown that the optimum coefficients of porosity decrease with an increase in the transmitted power and in the rated voltage, and that these coefficients increase with increasing cable length. The paper was presented by the Department of Electrical Networks and Systems, Belorussian "Order of the Red Banner of Labor" Polytechnical Institute. Figures 3; references 3 (Russian).

USSR

UDC 621.37/.39:534

POSSIBILITIES OF FAST VARIATION OF THE FOCAL LENGTH OF AN ACOUSTIC SYSTEM

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 827-833 manuscript received 5 Jul 77

RPOKLOV, V. V.

[Abstract] A discussion is presented of the principle of construction of a focusing system based on spiral structures with the delayed waves in the microwave band. An analysis is made of the possibility of its electronic adjustment. The structural parameters of spiral focusing systems are calculated. The investigation of the problem of the possibility of fast (electronic) variation of the focal length of the acoustic focusing systems establishes that the control of acoustic beams is possible if the spiral structure on the surface of a solid state is excited by decelerated electromagnetic waves in the microwave band. The obtainable parameters in the case of a LiNbO_3 crystal are given, demonstrating the possibilities for controlled focusing in the microwave band. The variation of the focal length in the systems can be quite sharp when the dispersion properties of the meander and other strip decelerating structures are used. Sound excitation by the decelerated waves is then obtained either as a result of the piezoelectric properties of the sound guide material or as a result of the piezoproperties of the films forming the strip line. The author thanks Professor E. Ash and all the coworkers of the Physical Electronics Group of the London University College for submitting the possibility of accomplishing his work, and for useful discussions. Figures 9; references 7: 2 Russian, 5 Western.

USSR

UDC 621.316.727

CONTROLLED ELECTROACOUSTIC PHASE SHIFTER

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian No 4, 1978 pp 818-826 manuscript received 22 Nov 76

ALEKSANDROVICH, G. YE., GUREVICH, G. L., KOSHURINOV, YE. I., RYABOV, V. F., SANDLER, M. S., and SUROVENNYY, V. G.

[Abstract] A study was made of a controlled electroacoustic phase shifter in order to discover the theoretical possibilities of using the system as a reflecting phase shifter and the possibility of its use for tuning the natural frequencies of an acoustic resonator. Good agreement was obtained between the experimental and calculated results for a phase shifter made up of two counter rod converters, and the phase tuning limits were determined. Figures 4; references 4: 3 Russian, 1 Western.

POLAND

USE OF ACOUSTIC SURFACE WAVES IN ELECTRONICS

Warsaw ELEKTRONIKA in Polish Vol 19 No 2, 1978 pp 52-60

DANICKI, EUGENIUSZ, Military Technical Academy

[Abstract] A review is presented of the principles of action and the applications of acoustic surface waves in electronics. The basic structural components are described of subassemblies using surface waves, i.e., band filters, resonators, banks of filters, dispersion and code filters, convolvers, and electronic acoustic subsystems using pulse sequence generation, delay line, and Fourier signal analysis. The review is chiefly based on No 5 1976 of Proc. IEEE and on materials published of the Ultrasonic Symposium (Annapolis 1976). In Poland, microwave acoustics was first developed at the Military Technical Academy by a team headed by Prof. Dr. habilitate Engr. Sylwester Kaliski. But the real progress in this field may begin only when designers of electronic systems fully understand great potentialities of this direction. A comprehensive Polish monograph is now in preparation, one of whose chapters will be devoted to subassemblies using acoustic surface waves. Figures 20; tables 2; references 21: 4 Polish, 17 Western.

Electromagnetic Wave Propagation;
Ionosphere, Troposphere, Electrodynamics

USSR

UDC 621.317.723

MEANS OF IMPROVING THE PRECISION WITH WHICH THE ELECTRON TEMPERATURE IS
MEASURED IN THE IONOSPHERE BY THE HIGH-FREQUENCY SOUNDING TECHNIQUE

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 74-75 manuscript received
28 Dec 77

PYADYSHEV, V. G., LYUTENKO, V. F. and TARASOV, N. I.

[Abstract] An analysis of the factors reducing the precision and speed of measuring the temperature of ionospheric plasma electrons by a high frequency probe indicates that the most significant source of error is the significant variation of the differential resistance and capacitance of the probe when the distance from the surface of the planet is varied. Expressions for the differential resistances of stationary and moving probes are derived. Curves drawn from these expressions and curves for the relative instability of the voltage on the probe as a function of altitude are presented for given measurements. The calculation results show that the precision of measurements can be improved by optimal selection of the relation between the radius of the probe and the capacitance of the coupling and also by improving the amplitude stability of the high-frequency oscillator and the stability of the amplifier transmission coefficient. Circuitry which compensates for the coupling capacitance with respect to low-frequency helps resolve the problem of high speed with high precision. Figures 2; references 6: 5 Russian, 1 Western.

USSR

UDC 621.371.25

TO AN INTERPRETATION OF MEASUREMENT OF AMPLITUDE AND PHASE OF INTENSE RADIO
WAVES IN THE IONOSPHERE

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 5, 78 pp 638-645 manuscript received 10 Nov 76

RYZHOV, V. A., Scientific-Research Radio Physics Institute

[Abstract] As is known, propagation of a powerful radio pulse in the ionosphere is accompanied by nonlinear absorption of the pulse and a considerable change of its phase. In an experiment, measurements were made of the amplitude and phase of radio pulses with a duration of 600 microsecond at a frequency of 1.35 MHz, close to the local gyrofrequency. A quantitative evaluation of these measurements is given in a previous paper [Z. N. Krotova, N. D. Krupenya and V. A. Ryzhov, IZV. VUZ: Radiofizika 20 No 1, 72(1977)].

The present paper considers the qualitatively distinctive features of the interaction of radio waves with various frequencies and presents the results of numerical integration of equations which describe the self-action of radio pulses in the ionosphere. The interaction is considered of opposing waves of near frequencies in a homogeneous isotropic plasma, which is caused by heating nonlinearity of the medium. A wave equation for the field, an equation of the energy balance of the electrons, and an equation of motion of the electrons are presented. A variation of the amplitude and phase of a reflected radio pulse at a frequency of 1.35 MHz, as the result of self-action of waves, is considered. Such variations are shown to agree with the theoretical calculations of self-action parameters. The author is grateful to V. N. Gol'dberg and A. M. Tsvetkov for making numerical calculations. Figures 2; tables 1; references 6 (Russian).

USSR

UDC 532.717.11

AUTOMATIC SIGNALING DEVICES FOR ECHO-PULSE ULTRASONIC THICKNESS METERS

PRIBORI I SISTEMY UPRAVLENIYE in Russian No 2, 1978 pp 36-38

NUDEL'MAN, I. M., TSESLER, L. B., KALININ, V. A., GIMPEL'SON, V. B. and KHATIPOVA, S. V., engineers

[Abstract] Automatic signaling devices are a necessary part of modern, highly-productive ultrasonic echo-pulse thickness meters. These devices compare the instantaneous value of the thickness of the product with the assigned tolerance limits, and generate electric signals in case the thickness variation goes beyond the assigned limits. One such device is described in this article. A schematic diagram is presented of the signaling device, as well as an electronic device which signals any interruption of acoustical contact. The device can operate in the 0.3-30 μ s range, temperature instability is not over 0.5 percent per 10 C between 5 and 50 C. Figures 4; references 3 (Russian).

HUNGARY

UDC 539.121.7.074:681.2

MULTICHANNEL DOSIMETRIC MEASURING INSTRUMENT AND ITS POSSIBLE USES IN
RADIATION-PROTECTION MEASURING SYSTEMS

Budapest MERES ES AUTOMATIKA in Hungarian Vol 26 No 4, 1978 pp 141-143

BARANYAI, A., dr; DEME, S., dr; PELLIONISZ, P., dr; and ROVID, M. KFKI
[Central Research Institute of Physics, Hungarian Academy of Sciences]

[Abstract] The measuring system described is built from members of the Nuclear Industry Instrument Family, described in KFKI Report 76-71, published in 1976, featuring 100 by 160 mm printed circuit boards. The signals from the sensor detectors (Geiger-Mueller tubes, ionization chambers, and scintillation detectors) are converted into pulse sequences capable of driving cables terminated with 50-Ohm wave impedance. The pulses are transmitted to the central signal processor through cables. The central signal processor consists of linear or logarithmic pulse-frequency meters, displays, signal-checking and alarm-generating units, and power supply. The system has been in use for several years and has performed satisfactorily. It may also be used to record the measured data. By outfitting the Geiger-Mueller tube with an exit window, the system may also be used to measure soft beta radiation. Special Geiger-Mueller tubes (such as the SzTSz Soviet-made No 6 tube) permit alarms to be issued if the signal exceeds a prescribed level and is afflicted with considerable background noise. By selecting the proper scintillation detector type, neutron radiation may be monitored. Figures 2; references 2 (Hungarian).

HUNGARY

UDC 543.27:535.34-1

THE USE OF THE INFRAMIK-E GAS ANALYZER, OPERATING ON THE PRINCIPLE OF INFRARED RADIATION ABSORPTION, IN ENVIRONMENTAL PROTECTION

Budapest MERES ES AUTOMATIKA in Hungarian Vol 26 No 4, 1978 pp 149-151

BARKOCZI, GABOR, and FISCHER, LASZLO. Research Institute of the Instrument Manufacturing Industry

[Abstract] The INFRAMIK-E analyzer is a non-dispersive infrared gas analyzer. It is used to measure emissions (the INFRAMIK-K version is used to measure a single component, such as carbon monoxide in engine exhaust gas) of two components simultaneously and record the data. The following gases may be monitored: carbon dioxide, carbon monoxide, ammonia, chloroform, trichloroethylene, methyl alcohol, and ethyl alcohol. The instrument operates at 220 V (50 Hz) line voltage in the 5-40°C temperature range, weighs about 5 kg, has the dimensions of 160 by 180 by 400 mm, and measures in the 0 to 50

percent by volume concentration range in 10 steps. The output signal is 0 - 5 mA, and the flowthrough of test gas is 50 liters per hour. Detection limit is 4 percent of full deflection; sensitivity to line-voltage fluctuations, location, and atmospheric-pressure fluctuations is adequate. Some proven uses include the monitoring of carbon dioxide and carbon monoxide in combustion processes, solvent-recovery monitoring in chemical industries, and measuring the carbon monoxide content of the firing atmosphere in order to regulate ceramic-industry processes. Figures 2; tables 1; references 5: 2 German, 3 Hungarian.

USSR

UDC 65.012.6:534.1.08

WORK IN THE LABORATORY OF VIBROACOUSTIC MEASUREMENTS

Moscow IZMERITEL'NAYA TEKHNICA in Russian No 5, May 78 pp 11-12

SIVETS, V. N., MALLIN, U. R., BUKHVIS, G. S. and SAFRONOV, A. A.

[Abstract] The article describes the work of the Laboratory of Vibroacoustic Measurements of a production association. Typical operations involve the measurement of noise and vibration levels and determination of the effectiveness of insulation for sound and vibration. An information flowchart is given which shows the relations between the laboratory and other departments of the association (accident prevention, medical services, preventive maintenance, subdivisions that use air hammers). The laboratory bears the responsibility of recommendations on eliminating the health hazards caused by high noise and vibration levels. Figures 1; references 2 (Russian).

USSR

UDC 621.317

PROSPECTS FOR DEVELOPMENT OF HEAVY-DUTY DISCRETE-ANALOG DEVICES WITH ELECTRO-OPTICAL SCALES

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1978 pp 34-35

LITVINCHUK, S. A., engineer, and AGREST, R. I., engineer

[Abstract] The most suitable electronic measuring instruments for severe operating conditions (wide temperature range, intense vibration and impact loads) are those with discrete-analog electro-optical scales and analog-digital converters. In the Soviet Union, voltmeters in this category are produced at the Tochelektropribor Precision Electronic Instrument Plant in Kiev (the model F5090) and at the Vitebsk Electronic Measuring Instrument Plant (the F7054). These instruments have electroluminescent scales and can be used where measurement error must not exceed 1.5 percent. Smaller, lighter, less expensive instruments use converters based on elements with threshold characteristics. The measurement error of these instruments is no more than 2.5-4 percent. In addition to exceptional mechanical stability and strength, instruments with electro-optical scales are not subject to errors caused by vibration, shocks and so forth, as are instruments with moving parts. As a result, measurement error is cut by a factor of 2-3 with no change in the class of precision. The Vitebsk Electronic Measuring Instrument Plant is now producing a voltmeter with electroluminescent scale and a control circuit based on elements with threshold characteristics (model F80), and is completing preparation for series production of the F800 voltmeter and

the F801 ammeter. Coordination plans call for several plants to complete industrial development and production of several series of instruments with electro-optical scales (gas-discharge, cathodoluminescent and electro-luminescent) by 1980 for heavy-duty operation. The work is being delayed by a lack of series-produced electro-optical scales and certain microelectronic elements working at temperatures from -50 to +50°C. Tables 1.

NOISE FACTOR MEASUREMENTS OVER THE LOW-FREQUENCY RANGE

Warsaw ELEKTRONIKA in Polish Vol 19 No 2, 1978 pp 67-68

ZDYBEL, ZENON, Institute of Electronic Technology, Gdansk Polytechnic; and
KARASZEWSKI, MIECZYSLAW, Industrial Institute of Electronics of the Scientific Production Center of Semiconductors, Warsaw

[Abstract] The noise factor F measurement of four-terminal networks over the low-frequency range is much more difficult as compared to that over the super-audio frequency range. The principle of operation of devices used in measuring the noise factor of low frequency transistors with gain stabilization of the measuring path is described. On the basis of this principle two devices for measuring transistors were built: a device designed at the Experimental Laboratory of the Industrial Institute of Electronics of the Scientific Production Center of Semiconductors in Warsaw is intended for testing transistors over the frequency range of 1 kHz, and a device designed at the Institute of Electronic Technology of Gdansk Polytechnic permits measurements of the differential and overall noise factor over the low frequency range and is intended for laboratory measurements. Basic technological parameters of the latter device are given and a photograph of it is shown. Figures 2; references 7: 2 Polish, 4 German, 1 Russian.

USSR

UDC 621.317.43

METHOD OF MEASUREMENT OF HYSTERESIS CURVES OF ELECTRIC ENGINEERING STEEL
IN A LOCAL AREA OF A SHEET

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 217-218

GRECHKIN, YEVGENIY TIMOFEYEVICH, candidate in technical sciences, Dotsent
of the Affiliate of Vladimir Polytechnical Institute at Kovrov

[Abstract] The most promising method of determining the instantaneous values of field intensity and magnetic induction at any point on a hysteresis curve in order to increase the accuracy and resolving capacity of measurement of hysteresis curves on sheets and strips in local areas, is pulsed extraction of the areas of interest from the curves of B_t and H_t as functions of T . The essence of the method consists in simultaneous feeding of short control pulses 0.5-1 μ s in length to the mixers of the field intensity and magnetic induction measurement channels, where the pulse is cut out of the curves of $B_t=f(t)$ and $H_t=f(t)$. An installation is suggested which consists of an audio oscillator, power amplifier, magnetic transducer, magnetic field voltage-measurement amplifier, two voltmeters, an integrating amplifier for the magnetic induction measurement section, a phase shifter, a short control pulse shaper, two mixers and pulse voltmeters. The operation of the system is described. The device can measure points on the hysteresis curve and can also measure the coercive force and residual induction corresponding to the moment in time for which the instantaneous value of magnetic induction or magnetic field intensity is equal to 0. Figures 1; references 3 (Russian).

USSR

UDC 621.317.537.7

A DIGITAL INSTRUMENT FOR MEASUREMENT OF MAGNETIC PARAMETERS

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 168-171
manuscript received 29 Dec 76

MASLOV, YURIY NIKOLAYEVICH, candidate in technical sciences, Dotsent Vladimir Polytechnical Institute

[Abstract] Increasing the accuracy of measurement of such magnetic parameters of ferromagnetic materials, as the coercive force and residual magnetic induction upon switching in a variable magnetic field, usually involves an increase in complication of systems and in the requirements for accuracy and stability of characteristics of the elements used. The task has thus arisen of creating measurement apparatus which can be technically realized simply and even provide sufficiently high accuracy of measurement over a broad

frequency range. The method of statistical testing, used for determination of integral characteristics of periodic signals and generation of results directly in digital form, is of interest in this respect. Functional diagrams and descriptions are presented of devices for measurement of the instantaneous values of periodic signals and of coercive force and residual magnetic induction based on this method. A digital instrument has been developed for measurement of coercive force and residual induction; the device is quite accurate (error ± 3 percent), yet simple and light (3 kg) and the accuracy can be increased by increasing the total number of tests or by increasing the sensitivity and stability of operation of the comparison circuit. Figures 2; references 7 (Russian).

USSR

UDC 621.378.3:621.317.36

MEASURING THE PARAMETERS OF OPTICAL RADIATION WITH FREQUENCY AND PHASE MODULATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 29-34
manuscript received 29 Jun 76; after revision 31 Jan 77

POPOV, L. N. and MIKHEYEV, YU. S.

[Abstract] Methods previously developed in Soviet literature for the measurement of the frequency and phase modulation parameters of optical signals using slow response photodetectors are further developed. The analysis is based on the use of a Michelson interferometer, although for the case of phase modulation at low modulation indices the modulation index and frequency deviation can be measured without inserting an interferometer in the measurement circuitry. Experimental confirmations of the procedures developed for both the low modulation level case and the general case of any modulation level are treated. In both the high- and low-level modulation cases, a GS-22 generator drove the modulator and an LG-36 laser was the optical source. For the low level measurement tests, the generator was two watts and the microwave signals were modulated at 1 KHz by a meander. The resonator was matched to the feed waveguide by a smooth junction and an inductive diaphragm. The tuned resonator parameters were: modulating frequency, 2.75 GHz; VSWR, 1.1; and the loaded Q, 56. The modulation bandwidth was 50 MHz. The KDP crystal used in the modulator was 73 mm long and the area of the end faces was $2 \times 1 \text{ mm}^2$. The protective glass plates for the crystal were polished to within $1/20$ of the wavelength. The design value of the modulation index was 0.14 and that determined experimentally was $m = 0.16$. The frequency deviation was 440 MHz. A deficiency of the low level procedure was the dependence of the refraction indices on the temperature, and the optical wedges has to be reset during the measurements. For the high

level modulation test configuration, a maximum of $m = 1.92$ was achieved experimentally, and the frequency deviation in this case was 5.2 GHz. Figures 4; references 6 (Russian).

USSR

UDC 681.382.323

A SIX-CHANNEL COMMUTATOR BASED ON MDS TRANSISTORS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 5, 1978 pp 95-98
manuscript received 4 May 77

BERZIN, L. F. and YAKIMAKHA, A. L., Kiev

[Abstract] The authors consider multichannel commutators based on MDS transistors with an induced p-channel and show that an increase in the number of channels increases the error of transmission of low levels of input voltages. A six-channel commutator is described with a control circuit based on supplementary MDS transistors. This circuit was developed for controlling the recording system of a monopolar mass spectrometer, and has the following characteristics: number of registration channels--6, time of registration of one channel--5 s, duration of one cycle--30 s, time for switching between channels--50 ms. The maximum instability of the duration of one working cycle and time of registration of one channel in the temperature range from +10 to +50°C is ± 0.1 percent/°C, and with variation of supply voltages-- ± 0.8 percent/V. Figures 3; references 4 (Russian).

USSR

UDC 621.396.962.23:532.574.7

POTENTIAL ACCURACY OF COHERENT-DOPPLER MEASUREMENT OF TURBULENT FLOW VELOCITY

Kiev IZV.VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 9-14
manuscript received 20 May 77; after revision 24 Oct 77

GLAZOV, G. N. and IGONIN, G. M.

[Abstract] A class of laser Doppler anemometers is considered in which a laser beam scattered in some volume of a two-phase flow is mixed on a photocathode with a reference beam or with a beam from the same laser scattered at a different angle in the same volume of the flow. An expression is

found for the variance of the characteristic frequency of the energy spectrum of the useful component of the photocurrent at the output of the photodetector, and the correlation function of the photocurrent is determined as applied to conditions of free (e.g. atmospheric) turbulence. On the basis of this function a solution is found for the problem of the potential (in the sense of the maximum a posteriori probability density function) accuracy of measurement of the local velocity of a turbulent flow over a finite time interval. The correlation function of the Doppler component of photocurrent which is found in this research accounts for fluctuations of the velocity distribution, randomness of the positions and dimensions of scatterers, and enables analysis and synthesis of the characteristics of post-detector processing that depend on photocurrent fluctuations. In particular, the formulas derived on this basis enable calculation of the variance in the estimate of flow velocity with respect to maximum a posteriori probability density in cases of "fast" and "slow" fluctuations. Figures 1; references 7 (Russian).

USSR

UDC 658.512.6.012:621.317.723

A UNIVERSAL ELECTROMETRIC COMPLEX FOR SCIENTIFIC RESEARCH

Moscow IZMERITEL'NAYA TEKNIKA in Russian No 5, May 78 pp 53-54

SATAROV, V. V., GARF, L. M., GRAFOV, V. S., MATROSOV, V. A. and SHMIDT, A.M.

[Abstract] The present paper is a report on development of an electrometric instrument complex at the All-Union Scientific Research and Design Institute of Scientific Instrument Making (VNIINauchpribor) to meet the requirements of measuring voltages and currents approaching the level determined by thermal noises. This series of instruments is now being put into production at the Voronezh Etalon Plant and includes the ITN-7 high-sensitivity electrometer, the EM-1 wide-band electrometer, a device for measuring impedances and resistivities of solid dielectrics and the IT-12 low-current source. The ITN-7 electrometer has the following basic technical specifications: voltage measurement from $3 \cdot 10^{-4}$ to 30 V in 11 ranges, current measurement in the linear mode from $2 \cdot 10^{-16}$ to $3 \cdot 10^{-6}$ A, in the integration mode-- 10^{-15} - $3 \cdot 10^{-10}$ A, in the logarithmic mode-- 10^{-12} - 10^{-7} A, resistance measurement 10^6 - $5 \cdot 10^{17} \Omega$, volumetric resistivity range 10^6 - $10^{19} \Omega \cdot \text{cm}$, surface resistivity range 10^7 - $8 \cdot 10^{18} \Omega$. Technical specifications of the EM-6: voltage measurement range $3 \cdot 10^{-3}$ -30 V, current strength measurement $3 \cdot 10^{-14}$ - $3 \cdot 10^{-6}$ A in the linear mode, 10^{-12} - $3 \cdot 10^{-7}$ A in the logarithmic mode, 10^{-12} - $3 \cdot 10^{-10}$ A in the integration mode, resistance range 10^6 - $10^{16} \Omega$. The IT-12

provides a calibrated current output of 10^{-16} - $9.99 \cdot 10^{-7}$ A with error of 0.5-10 percent. Settling time is no more than 10 s for currents down to 10^{-8} s, and up to 10 minutes for weaker currents. All instruments make maximum use of microelectronics. References 6 (Russian).

EAST GERMANY

PULSE REFLECTOMETRY IN THE TIME DOMAIN

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 3, Mar 78 pp 151-155

TURINSKY, GUENTER, graduate engineer

[Abstract] Pulse reflectometry is a convenient and rational technique for examining the high-frequency behavior of connections, components, and active circuits. It may be used in the laboratory and the factory with equal ease, and the equipment may be readily assembled from a pulse generator and a scanning oscillograph. The technique yields adequately accurate results for laboratory use, and the accuracy may be further increased by employing comparative measurements. A brief description is given in this article of the theoretical fundamentals of the technique, the pulse generator (internal resistance, pulse amplitude, pulse sequence, pulse configuration) and the oscillograph, and application examples are discussed. The examples concern the wave resistance of a wire, localization of cable defects, and the determination of very small capacitance and inductance values. Error sources are briefly discussed. Because of the high state of development of nanosecond pulse measurement technology, pulse reflectometry became a practicable method. Its advantages include the fact that the test time per sample is short, undesirable reflections can be eliminated and the effect of the elimination measures is immediately evident, no data transformation is needed since the measurement is made in the temporal domain, sensitivity and overcontrol resistance are high, and the method may be easily used. Expensive specialized equipment can be better utilized since pulse reflectometry permits many tests to be performed with simple and inexpensive equipment in its stead. Figures 6; tables 1; references 8 (German).

USSR

SCIENTIFIC-RESEARCH INSTITUTE OF HEAT AND POWER ENGINEERING EQUIPMENT AT THE ALL-UNION EXHIBITION OF ACHIEVEMENTS OF THE NATIONAL ECONOMY OF THE USSR

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1978 pp 50-52

VAYNBERG, M. A., engineer, ZAYGERMAKHER, D. M., engineer, and PLESKACHEV, A. A., engineer

[Abstract] The paper is concerned with a historical review of displays presented by the Scientific-Research Institute of Heat and Power Instrument Building at the All-Union Exhibition of Achievements of the National Economy of the USSR, beginning in the fifties. The earliest exhibits were elements of the aggregate unified system of automatic monitoring and regulation (AUS). The experience showed the effectiveness of this kind of advertising, and the AUS system was soon used extensively at many Soviet enterprises. The Institute has taken part in 16 exhibitions over the past 10 years. Recent exhibits have included pneumatic and electrical control facilities of the State System of Devices and Automation Equipment (GSP), which is currently the technical basis for automated management system for technological processes (ASUTP), as well as analog electrical control units (the Sapfir series of measurement transducers), and miniature measurement transducers with compensation of magnetic fluxes. Other displays include RUS type industrial level indicators for dielectric, conductive, explosive and aggressive liquids, a differentiator that measures the rate of change in pressure, and the Potok instrument for dry graduation of electromagnetic flowmeters. Specialists at the Institute have been awarded more than 100 medals and 5 first-class certificates for their exhibits. Figures 4.

Microelectronics, Integrated and Logic Circuits;
General Circuit Theory and Information

YUGOSLAVIA

UDC 621.372.62'3:621.38

PASSIVE AND ACTIVE THICK-FILM CIRCUITS FOR USE IN PROFESSIONAL AND COMMERCIAL ELECTRONICS

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian Vol 44 No 3, May/Jun 1977
pp 157-162 manuscript received 21 Jun 77

JAN, FRANC, Engr, Iskra Electronic Components Industry, Upori TOZD, Sentjernej;
HROVAT, MARKO, Engr, Jozef Stefan Institute, Jamova 39, Ljubljana, and KOLAR,
DRAGO, prof dr, Faculty of Natural Sciences and Technology, Ljubljana

[Abstract] The article discusses three types of passive thick-film circuits, -resistance circuits, RC circuits, and circuits with thick film potentiometers, -in terms of cost, quality, and tolerances in operating circumstances. Selection criteria include miniaturization, form of encapsulation, testability and component availability. Yugoslav technology has relied heretofore on classic discrete components and exposed silicon wafers, which are also used to produce hybrid thick film circuits. There has been no experience with flip-chip or beam lead components. Hybrid circuits, such as analog circuits with miniature components, are discussed as potential directions for development, because despite higher cost they offer greatly increased dependability. Yugoslav producers are turning to such circuits because of domestic demands for miniaturization and similar demands of their license partners abroad, but such components must still be imported. Figures 10; tables 1.

POLAND

UDC 621.38

SEMICONDUCTOR ELECTRONICS IN THE SOVIET UNION

Warsaw ELEKTRONIKA in Polish Vol 18 No 10, 1978 pp 380-382

FEDOTOV, Y. A. Translated from Russian and elaborated by Engr. Lidia Leda M. A.

[Abstract] A historical outline of the development of semiconductor electronics in the Soviet Union is given. The first Soviet transistor was designed in 1949 and the first batches of point-contact and then post-alloy-diffused transistors and diodes were produced in 1953-1954, and their serial production began in 1955-1956. The deficit in semiconductors that amounted to 30-50 percent was eliminated completely by 1967. The reliability of semiconductor devices amounts to 10^{-6} - 10^{-9} failure/hr. However the integrated circuits (IC) are the greatest success. The first Soviet germanium and silicon IC appeared in 1961-1962. Hybrid IC were also developed in parallel with the monolithic IC. The work on photolithography chiefly connected with

development of planar technology began in 1960-1961. Thanks to socialist integration and cooperation the optomechanical equipment with special requirements on the precision and resolution needed by the semiconductor industry has been designed and produced by the specialists of the NRD and USSR. A long list of this equipment and its description are presented. References 14 (Russian).

POLAND

UDC 621.389

VERY LARGE SCALE INTEGRATED CIRCUITS FOR DIGITAL SIGNAL PROCESSING

Warsaw ELEKTRONIKA in Polish Vol 19 No 2, 1978 pp 80-84

BUIE, J. Z. and ZIMMERMAN, T. A.

[Abstract] This is a Polish translation of an English article with the same title. It has been translated and elaborated by Andrzej Rusek and Leonid Bulhak (Institute of Industrial Electronics of Warsaw Polytechnic) and is intended to provide designers of basic circuits and systems with information concerning design of integrated systems and its utilization as a basis for definition of present-day directions in digital signal processing with use of very large scale integrated circuits. Figures 7; references 3 (Western).

POLAND

UDC 621.389

ACOUSTIC MEMORY WITH UTILIZATION OF SURFACE STATES IN PIEZOELECTRIC-SEMI-CONDUCTOR STRUCTURES

Warsaw ELEKTRONIKA in Polish Vol 18 No 10, 1977 pp 383-385

KORSHAK, B. A., LYAMOV, V. YE. and SOLODOV, I. YU. [Translated into Polish from a Russian MIKROELEKTRONIKA journal Vol 6 No 4, 1977--translator unknown]

[Abstract] Results are given of investigations of the acoustic memory phenomenon occurring upon interaction of counterprogressive surface acoustic waves in a SiLiNbO_3 layer structure in the piezoelectric (LiNbO_3) and semiconductor (Si) contact zone. Figures 3; references 6: 3 Western, 3 Russian.

POLAND

UDC 621.389

THE USE OF FOURIER OPTICS IN MICROELECTRONIC PHOTOLITHOGRAPHY

Warsaw ELEKTRONIKA in Polish Vol 18 No 12, 1977 pp 473-477

KALESTYNSKI, ANDRZEJ, and SMOLINSKA, BARBARA, Institute of Physics, Warsaw Polytechnic

[Abstract] The utilization of photolithography for masking in the micro-electronic technology of integrated circuits is given increasingly great attention. The principles of operation is described of a coherent optical system which consists of a coherent light source, illuminated transparency, lenses, and a photodetector placed in the image plane. This may be considered as an optical system which realizes a Fourier transform. By placing a black screen with transparent holes spaced periodically in the Fourier plane of the system, multiple images of the object in the image plane appear. With the use of a matched periodic filter, placed in the focal plane, the image multiplying optical system is utilized for obtaining microcircuit masks. Several thousands of micropatterns can be produced in a single operation by the application of multicascade multiplying systems. This technique may be utilized in the preparation of microelectronic masks. Figures 8; references 11: 9 Polish (including 7 in Western journals), 2 Western.

USSR

UDC 681.3.001:621.382

TRENDS IN DEVELOPMENT OF MICROPROCESSOR LSI TECHNOLOGY

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1978 pp 12-14

SONIN, M. S., candidate in technical sciences

[Abstract] The article reviews the current state of the art in microprocessor LSI circuitry, and examines the outlook for future developments. Representative examples of different types of LSI microprocessors are examined, all made by U. S. companies. Two trends can now be seen in microprocessor LSI circuits: on the one hand, existing multiprocessor chips are being supplemented by LSI peripheral devices, resulting in IC's with almost all the circuitry necessary for producing most computer and control units; on the other hand, single-chip microcontrollers are being developed for efficient handling of monitoring and control problems. It is expected that the proportion of 16-digit microprocessors will continue to increase. It is also expected that there will be an increase in bit configuration, improvement in organization of crystals in the LSI chip, increase in speed and reduction in cost. In addition, there should be a continued increase in the variety of peripheral circuits to enable effective connection to external objects, and an increase in the functional complexity of the LSI crystals. References 11: 7 Russian, 4 Western.

EAST GERMANY

METHODOLOGY AND PRACTICE OF FAULT ANALYSIS IN SOLID-STATE CIRCUITS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 4, Apr 78 pp 216-221

GROSSE, DIETER, and WANKE, REINER, graduate physicists, Institute of Microelectronics, Dresden

[Abstract] The authors demonstrate and explain, using as an example bipolar integrated circuits, that the reliability of solid-state circuits can be improved by design measures, by measures concerning the transfer of development information into production, production measures, and appropriate testing procedures. Defect analysis involves fault analysis and failure analysis. A survey is presented of various test methods used to obtain fault and failure data. The physical and chemical tests include determination of characteristic diagrams, experimental fault simulation, the light-emission method, thermography with liquid crystals, infrared thermal analysis, light microscopy, metallography, cover-layer defect site test, oblique surface grinding, electron microscopy, scanning electron microscopy, electron-beam microanalysis, ion-beam microanalysis, X-ray structural analysis, and X-ray topography. The starting materials may be analyzed for specific resistance, lifetime, and the like; the production process may be analyzed for temperatures such as diffusion-furnace temperature, process times, flowthrough, room temperature, atmospheric humidity, dust content of the air, and mechanical parameters; and the usual process-control tests and measurements may be carried out. Examples for a combination of tests and analyses for various solid-state circuits are presented. It is pointed out that proper fault-analysis methods and procedures must be considered in the earliest design and development stages for maximum benefit. These methods and procedures must be integrated in the entire design, development, production and quality-control system. Figures 22; tables 3; references 6 (Western).

USSR

UDC 621.373.5

A RECTANGULAR PULSE GENERATOR BASED ON MONOLITHIC INTEGRATED CIRCUITS

PRIBORY I SISTEMY UPRAVLENIYE in Russian No 2, 1978 pp 42-43

SAVCHENKO, YU. S., engineer

[Abstract] A rectangular pulse generator is described, matched to the low-impedance input of series K-155 integrated circuits by means of source repeaters. The device generates rectangular pulses at extremely low repetition frequencies. A schematic diagram is presented. An experimental model has been built and tested. It is suggested that the field-effect transistors used in the device might be replaced with MOS transistors in order to expand the functional capabilities of the chip. Figures 1; references 3 (Russian).

POLAND

UDC 621.392

VARACTOR-TUNED WAVEGUIDE X-BAND GUNN-DIODE OSCILLATOR

Warsaw ELEKTRONIKA in Polish Vol 18 No 9, 1977 pp 357-359

PIECKO, JACEK and SZYMCZAK, ANDRZEJ, Institute of Electronic Technology,
Warsaw Polytechnic

[Abstract] Results of investigations of a waveguide x-band Gunn-diode oscillator are given. The oscillator is varactor tuned, but mechanical tuning is also possible. The design of an equivalent circuit of the oscillator based on the circuit analysis of a two-post diode-mounting structure in the waveguide is described. The electronic tuning range of the oscillator has been estimated. Figures 5; references 12 (Western).

USSR

UDC 535.24.15:621.378.325

CONCERNING METROLOGICAL SUPPORT OF PULSE PHOTOMETRY IN THE INFRARED LASER BAND

Moscow IZMERITEL'NAYA TEKHNICA in Russian No 5, May 78 pp 30-31

ROMASHKOV, A. P.

[Abstract] The author considers questions of metrological support for measurements of the parameters and characteristics of pulsed lasers in the 1.5-10.6 μm wavelength band, particularly for determination of the shape of optical pulses. A fundamental problem in this field is that the time parameters of the optical pulses are coming close to the limit of the lag time of most photoresistors used as sensors in infrared pulse analyzers. This problem is solved by using oscilloscope memory tubes with charge storage with subsequent discrete readout of the recorded signal, and also by using transmitting tubes of the vidicon type with digital input to a computer. In this procedure, it is necessary to compute the time lag of the specific measurement medium that is used. The author discusses the concomitant problems. References 10: 7 Russian, 3 Western.

USSR

UDC 621.375.826:594.1

MEASUREMENTS OF THE SPACE-ENERGY CHARACTERISTICS OF LASER EMISSION IN THE INFRARED REGION OF THE SPECTRUM

Moscow IZMERITEL'NAYA TEKHNICA in Russian No 5, May 78 pp 21-23

MOROZOV, P. A. and RUKMAN, G. I.

[Abstract] A brief review is given of instruments and techniques for converting IR laser emission to visible light in order to determine the space-energy characteristics of this type of radiation. Methods of visualizing infrared radiation are divided into two classes: 1) Methods which use effects of photoemission, electrofluorescence, evaporography, edge absorption, magneto-optic effects, up-conversion, photochemical and electrophotographic effects and so forth; and 2) Methods based on the principle of scanning. Various methods of information conversion used in measurements of the space-energy characteristics of laser emission are discussed, and particular attention is given to systems for measuring the relative distribution of power density based on photoelectric and pyroelectric radiation detectors. An example of such an instrument is the 100-channel IRE-100 calorimeter for automated registration of the energy distribution in the cross section of pulsed laser radiation. The instrument determines beam divergence and the position of the axis of the polar pattern. Systems for measurement of cw or quasi-steady state laser emission use sequential scanning. References 7 (Russian).

USSR

UDC 621.373.826

PROCEDURE FOR STUDYING PULSED LASER EMISSION FLUXES BASED ON THIN-FILM THERMOMETRY

Moscow RADIOTEKHNIKA I ELECTRONIKA in Russian No 4, 1978 pp 785-792 manuscript received 12 Nov 76

BAUTIN, A. V., IL'IN, A. A., POLYAKOV, YU. A., SAFRONOV, V. I. and SHILYAYEV, A. A.

[Abstract] A procedure is described for measuring the energy flux density of pulsed lasers on the basis of thin-film thermometry, which includes the development of the sensor, engineering design of the analog computer, calibration of the measuring channel and analysis of the measurement errors. After selecting the radiation receiver, in order to obtain the absolute values of the energy flux density, the primary role is played by the problem of the radio technical processing of the signals. The synthesis of a linear radio engineering circuit realizing the channel transmission function is analyzed along with the errors occurring in the electronic circuitry of a digital system with lumped parameters when realizing an irrational transmission function. Because it is theoretically impossible exactly to realize the transmission function of an analog converter in the form of a system with lumped parameters, the transfer function was approximated by a rational polynomial expanded in the trailer series. An optical bench built on the basis of the GOS-30-M laser with an emission wavelength of $\lambda = 1.06$ microns was used to study the dynamic characteristics of the functional channel. It was found that with proper realization of transition function, the pulsed energy fluxes can be measured without significant phase-amplitude distortions to frequencies of about 10 megahertz. The dynamic errors in the channel can be reduced to a minimum. Figures 3; references 5 (Russian).

USSR

UDC 621.373.826.038.823

STUDY OF THE TIME-SPACE CORRELATION OF THE FLUCTUATIONS OF THE RADIATION INTENSITY OF HELIUM-NEON LASER

Moscow RADIOTEKHNICA I ELEKTRONIKA in Russian No 4, 1978 pp 793-797 manuscript received 28 Feb 77

RENDEL', YU. S.

[Abstract] An experimental study is made of the spatial correlation of the radiation intensity fluctuations in a plane perpendicular to the direction of propagation of a helium-neon laser beam. The normalized mutual spectral density of the intensity fluctuations was determined in the range of 5 to 100 kilohertz for operation of the laser under conditions of generating the basic TEM_{00q} transverse mode and simultaneous generation of two transverse modes TEM_{00q} and TEM_{01q} . A wavelength of $\lambda = 0.63$ microns was used. The strong correlation between the intense fluctuations of the generated modes is explained by the interaction caused by the effect of saturation of the active medium by the fields of the types of oscillations generated. The interaction mechanism is also valid for transverse types of oscillations. The author thanks S. A. Akhmanov, V. I. Shmal'gauzen and A. S. Chirkin for helpful remarks during discussion of the paper. Figures 5; references 11: 7 Russian, 4 Western.

USSR

UDC 621.375.826.038.84

A SCANNING ANALYZER OF THE SPATIAL DISTRIBUTION OF CO_2 LASER RADIATION

Moscow IZMERITEL'NAYA TEKHNICA in Russian No 5, May 78 pp 24-25

MOROZOVA, S. P., MOROZOV, P. A., LISYANSKIY, B. YE., SHOLOKHOV, V. A., MALYSHEVA, T. P. and PERFILOVA, T. G.

[Abstract] The article describes the LV-3 Laserovisor for checking the distribution of CO_2 laser emission in optical channels where the power density is 10^{-6} W/cm² or less. This is a high-speed, high-sensitivity instrument which produces a visible image of the cross section of infrared laser emission on the screen of a kinescope with brightness proportional to the beam power. Vertical beam scanning is at a rate of 12.5 Hz, and horizontal scanning is at 1600 Hz. The focusing element is a parabolic mirror. The radiation sensor is a CdHgTe photoresistor cooled by liquid nitrogen. Diagrams of the optical and electronic parts of the instrument

are given. Both amplitude and phase measurements can be made on a wavelength of $10.6 \mu\text{m}$. The instrument has the following technical specifications: spectral range 9-11 μm , minimum recordable power density without optical attachment 10^{-6} W/cm^2 and with optical attachment 10^{-3} W/cm^2 , permissible power density without optical attachment 10^{-3} W/cm^2 and with optical attachment 1 W/cm^2 , diameter of input aperture without optical attachment 60 mm and with optical attachment 3 mm, number of lines 100, frame frequency 12.5 Hz. Figures 4.

USSR

UDC 621.375.826:621.374

A MULTICHANNEL DEVICE FOR MEASURING THE ENERGY OF LASER EMISSION PULSES

Moscow IZMERITEL'NAYA TEKNIKA in Russian No 5, May 78 pp 25-26

GEL'MAN, M. M., ZAGORSKIY, YA. T., KUZNETSOV, A. A. and LEVI, A. M.

[Abstract] A device is described for measuring the parameters of laser pulses over wide power and spectral ranges with digital output. The unit has 20 input channels with sensors placed at different positions of the radiation field. Each sensor is a measurement transducer with a conversion coefficient of about $150 \mu\text{V/J}$. The transducer signals are commutated by a stepping switch with a speed of about 15 steps per second. The signals are sent to an analog-digital converter which produces the readout. Technical specifications: measurable energy range 0.15-6 J, conversion coefficient of the measurement channel $0.6 \pm 0.1 \text{ V/J}$, spectral range 0.69-11 μm , emission pulse duration at least 10 ns, main measurement error no more than 25 percent, reproducibility of measurement results within 7 percent, temperature error 0.15 percent/ $^{\circ}\text{C}$ in a temperature range of 10-35 $^{\circ}\text{C}$, punched tape data recording for all 20 channels no more than 3 s, printout time 3 minutes, length of connecting measurement cables about 3 m, power consumption 500 VA. The number of channels can be increased to 50, and if another stepping switch is included the number of channels can be increased to 100 without any increase in punched tape registration time. Figures 2.

USSR

UDC 621.375.826:771.39

INFRARED HOLOGRAPHY BASED ON SCANNING IMAGE CONVERTERS

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 5, May 78 pp 29-30

RUKMAN, G. I., LISYANSKIY, B. YE., MOROZOV, P. A. and MOROZOVA, S. P.

[Abstract] The article describes a holographic facility for a wavelength of 10.6 μm with holographic registration by an electro-optical device with scanning of the IR image relative to the radiation receiver and reproduction of a visible image of the IR hologram on the screen of a video monitor. The installation includes a cw CO_2 laser, a massive base to hold the optics, and a display. The image on the screen is recorded on film. By using scanning converters with a spatial resolution of the order of 150 μm , this facility can produce far-infrared holograms with high energy sensitivity. Figures 1; references 1 (Russian).

USSR

UDC 621.384.32

EVALUATION OF THE EFFECT THAT THE LAG OF PHOTOCELLS HAS ON CONDITIONS OF
DETECTION OF COMPLEX SIGNALS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 5, 1978 pp 110-
114 manuscript received 11 Jul 77

LEBED'KO, YE. G. and TIMOFEYEV, O. P.

[Abstract] A technique is proposed for real-time evaluation of the signal-to-noise ratio in systems with a lagging photoreception tank circuit which are used in LIDAR [Laser Infrared Radar] detection of large objects of complicated shape. To evaluate the influence that the time lag of the photoreception tank circuit has on the conditions of detection of signals reflected from such objects, the actual signal received when the objects are exposed to short optical pulses is replaced by a square pulse of the same energy that has an equivalent duration. The technique is illustrated by using the resultant formula to plot curves for the influence of photocell lag on signal-to-noise ratio when 10 ns pulses are reflected from large objects of complicated shape at different angles corresponding to different values of the duration of the equivalent square pulse. A curve is also given for the same relation when a flat surface with uniformly diffuse reflection is exposed to normally incident radiation. The results can be used to determine the reduction in the signal-to-noise ratio caused by photocell lag. The average losses in the signal-to-noise ratio may be much lower for large objects of complicated shape than for a flat surface perpendicular to the incident radiation. The paper was recommended by the Department of Optical-Electronic Devices, Leningrad Institute of Precision Mechanics and Optics. Figures 2; references 5 (Russian).

USSR

UDC 621.391.2

INFORMATIONAL PROPERTIES OF THE PARAMETERS OF RADAR SIGNALS FOR RECOGNITION
PURPOSES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 132-136
manuscript received 18 May 77; after revision 29 Aug 77

KOSENKO, G. G.

[Abstract] The author considers a sequence of classes of radar objects with given a priori probabilities of appearance in the zone of radar observation. It is assumed that a certain set of parameters is given, and that each class of objects is described in the language of this set with a given completeness. Using the concept of measures of radar information, the author

determines the amount of information delivered by a given set of parameters by using the Kotel'nikov, Shannon and Kul'bak measures of radar information. The informativeness of a set of parameters for one class relative to another is defined, and it is shown that the amount of information depends on the informativeness of the set of parameters. Analyzing devices are proposed which are based on the criterion of informativeness and on the criterion of amount of information. These devices can detect classes of objects for which a given set of parameters is sufficiently informative and can filter out the classes for which the set of parameters is not sufficiently informative. Figures 2; references 2 (Russian).

USSR

UDC 621.391.8

THE NOISE IMMUNITY OF RADIO SYSTEMS USING COMPLEX SIGNALS IN PULSED AND CW MODES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 125-128
manuscript received 13 Feb 76; after revision 28 Mar 77

SMIRNOV, N. I.

[Abstract] Using radars as an example, it is shown that considering the actual statistical characteristics of sidelobe spikes of correlation functions permits an objective comparison of the noise immunity of radio engineering systems in pulsed and continuous modes. While the analysis procedure is also applicable to information transmission systems, the comparative noise immunity analysis in this case is carried out for a sounding signal generated from a continuously varying random sequence. In the pulsed mode, optimum processing of the received complex signal is accomplished in an electronically tuned discrete matched filter. Simultaneously with the emission of the sounding signal consisting of N elemental pulses, a segment of the random sequence is written into a reference register, and based on this segment, the sounding signal is generated and stored in the reference register until the emission of the next probe pulse, which is generated and stored in the register in a manner similar to the preceding one. The amplified return is written into a receive register. When it coincides with that stored in the reference register, a peak in the two-dimensional aperiodic autocorrelation function appears at the output of the adder. In the continuous mode, optimal processing is carried out in a correlator, while the delay of the stored random sequence can be varied through the choice of the tap of an electronically tuned discrete delay line. The continuously varying random sequence is fed to the transmitter modulator and is written into the shift register of the delay line. The noise immunity of these two systems in the pulsed and CW modes for tracking radars with pencil beam antennas is

compared for worse case conditions when detecting a weak signal at the receiver input. Expressions are derived for the pulsed and CW signal-to-noise ratios with and without jamming. Considering the probability parameters and its probable operational situation, a designer can assess the gain in the noise immunity for the pulsed mode. The calculations for a typical case show that for a false alarm probability of 10^{-6} , the detection probability for the pulsed mode is 0.9999, and only 0.8 for the CW mode. This is explained by the level of the statistical characteristics of the sidelobe peaks of the two-dimensional, aperiodic correlation function being lower than that of the two-dimensional periodic correlation function, as well as by the lack of interference from the transmitter. References 7 (Russian).

USSR

UDC 621.396

SIGNAL SYNTHESIS WITH RESPECT TO A CRITERION OF ACCURACY OF JOINT MEASUREMENTS OF DELAY AND FREQUENCY

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, 1978 pp 85-88 manuscript received 16 Sep 77

ALESHIN, G. V.

[Abstract] The author considers the problem of signal synthesis for radar applications without restrictions on resolution:

$$\max \delta_{\tau}^2 = (xS, xS), \quad (1)$$

$$(S', S') \gg \sigma_{\omega}^2, \quad (2)$$

$$(S, S) = \overset{\circ}{S}, \quad (3)$$

where $S=S(t)$ is the signal envelope, $x=t/T$, $\overset{\circ}{S}=\overset{\circ}{S}/S_m^2 T$ is the reduced energy of the signal, $\overset{\circ}{S}$ is the energy of the synthesized signal, S_m is signal amplitude, T is the signal duration that contains its main energy (e.g. 99 percent), $\sigma_{\tau}^2=N_0 T/S_m^2 \sigma_f^2$, N_0 is the spectral density of noise, σ_{τ}^2 and σ_{ω}^2 are the required variances of measurement errors for signal delay and frequency, $\sigma_{\omega}^2=N_0/S_m^2 T^3 \sigma_f^2$. It is shown that signals synthesized on the basis of parabolic cylinder functions are most effective where the required accuracies of range measurements are higher than the accuracies of velocity measurements and the required amplitude is lower than that of a gaussian pulse. The gain is most appreciable for high relative accuracies of measurements of signal delay and frequency. References 3 (Russian).

USSR

UDC 621.396

INTERRELATION OF TRAINING AND WORKING CONDITIONS WHEN DISTINGUISHING ELONGATED TARGETS

Moscow RADIOTEKHNIKA in Russian No 4, 1978 pp 70-73 manuscript received 10 Feb 77 after completion

PESTRYAKOV, V. B. and GURBITS, V. L.

[Abstract] The results of a study of the influence of the interrelation of training and working conditions in distinguishing elongated radar targets are used to select the characteristics of the training and working conditions which will be most expedient from the point of view of high-quality performance and the difficulties in producing a given condition.

In performing the numerical calculations which are presented is assumed that the signals reflected from individual elements of the targets are distributed by normal laws of identical dispersions and by slowly varying mean values. The mean values are also distributed according to a normal law with identical dispersions and certain mean values that are different for different targets. The results of the calculations also indicate the interdependence of the training and operating characteristics. Figures 2; references 4: 2 Russian, 2 Western.

USSR

UDC 621.396.96

INVESTIGATION OF THE POSSIBILITY OF USING SIGNALS WITH A LINEAR FREQUENCY MODULATION FOR ESTIMATION OF THE PROPERTIES OF THE SEA SURFACE

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 5, 78 pp 710-713 manuscript received 12 Apr 77

BASKAKOV, A. I., Moscow Power Engineering Institute

[Abstract] As shown in the literature, it is possible to use the radar method of vertical sounding for distant indication of the state of the sea surface. It is assumed in the present paper that a pulse signal is radiated by a radar transmitter in a direction normal to the mean level of the sea surface. Using a phenomenological model of the sea surface in the form of a series of elementary reflectors, the parasitic signals from which are independent, have random amplitude, a delay and a uniformly distributed random phase from 0 to 2π , an expression is found for the correlating function of a signal reflected from the sea surface and which has passed a

matched receiver filter. By recording the form of the reflected pulse, it is possible to evaluate the root-mean-square height of the sea waves. Figures 2; references 5: 4 Russian, 1 Western.

USSR

UDC 621.396.96:621.391.82

EFFICIENCY OF RECURSIVE DIGITAL MOVING TARGET INDICATOR SYSTEM FILTERS WITH A SMALL SAMPLE SPACE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 122-125
manuscript received 25 Apr 77; after revision 8 Aug 77

GORSHKOV, A. K., LESNIKOV, V. A., PETROV, YE. P. and CHASTIKOV, A. P.

[Abstract] The paper gives the results of a study of the efficiency of a third-order Chebyshev digital filter in a moving-target indicator system with and without initialization. It is shown that a Fletcher-Burlage initialization gives a considerable gain in efficiency. Figures 3; references 5: 3 Russian, 2 Western.

USSR

UDC 621.396.96.08

EVALUATION OF THE STATE OF DYNAMIC OBJECTS FOR THE CASE OF REGULAR INTERRUPTIONS OF THE RECEIVED SIGNAL

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 50-54
manuscript received 24 Mar 77

KAZARINOV, YU. M. and SOKOLOV, A. I.

[Abstract] The authors consider methods of simplifying signal processing algorithms when there are regular interruptions in the received signal. It is assumed that the signal arrives at the input of the measuring instrument in the form of regular bursts of N pulses succeeding one another with period T . The recurrence period of the pulse bursts being $T_n = (N + M)T$, where N and M are integers. The proposed algorithms reduce the volume of calculations within the limits of a burst, thus reducing the requirements for computer speed in evaluating the state of dynamic objects. These suboptimum processing algorithms increase the volume of calculations between bursts, and therefore should be used in cases of low duty factor of the arriving pulse bursts. Figures 1; references 2 (Russian).

USSR

UDC 621.396.965

DYNAMIC ERRORS OF SMOOTHING OF A LINEAR TRAJECTORY

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 125-128
manuscript received 1 Mar 78; after revision 30 Jun 77

KHORUNZHIY, A. I. and LAVRINCHUK, V. M.

[Abstract] In synthesis of optimum algorithms for smoothing and extrapolation of the coordinates and parameters of target motion from a number of radar measurements, the widely used model of the target trajectory as a linear polynomial in the general case on an arbitrary course may lead to "dynamic" errors defined as the difference between the true range (and rate of change in this parameter) and the estimated values at any instant. Analytical expressions are found for the dynamic errors of smoothing as a function of the parameters of target motion in explicit form, and approximations are given for the maximum dynamic errors. Comparison of calculations by the given expressions with the true value of the errors shows that the proposed analytical expressions are suitable for estimation of the dynamic errors of a smoothing algorithm for the range and velocity of a target when the model of the trajectory takes the form of a linear polynomial if the target is in uniform rectilinear motion over an arbitrary course. Figures 2; references 3 (Russian).

USSR

UDC 621.396.98

ANALYSIS OF ACCURACY IN FINDING THE DIRECTION OF RANDOM FIELDS BY TWO-CHANNEL MONOPULSE SYSTEMS WITH AMPLITUDE METER

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 38-44
manuscript received 1 Dec 76

KOROTKOVA, V. M. and RYBAKOV, B. S.

[Abstract] An analysis is made of four types of monopulse direction-finding systems with amplitude and phase antenna pickups and an amplitude meter, the signal processing being linear and logarithmic. It is assumed that the angles of arrival of the random and regular components of the field are non-coincident for arbitrary power ratios. Exact analytical expressions are derived for the signal characteristics at the output of the amplitude meter with linear and logarithmic processing, and approximate simplified relations are presented for the special cases of weak and strong signals and weak correlation. The results of numerical analysis of errors are given. Figures 4; references 8 (Russian).

USSR

UDC 621.396.98-187

INVESTIGATION OF THE ACCURACY OF THE SINGLE-PATH METHOD OF RANGE MEASUREMENT

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 65-70
manuscript received 19 Jul 76; after revision 20 Jun 77

YURCHENKO, YU. S.

[Abstract] An examination is made of models of errors caused by oscillator phase drift and noises in the single-path and correcting channels of a single-path range finder in which correction is based on the principle of invariance to the parameters of motion of the object. The problem of optimum filtration is considered in cases where the correction interval is equal to one period and several periods of arrival of the pulses in the single-path channel. It is shown that the frequency of corrections can be reduced without impairment of accuracy only when the interference immunity of the single-path channel is sufficiently high. Figures 4; references 7: 4 Russian, 3 Western.

USSR

UDC 621.396.62

DIGITAL SHORTWAVE RECEIVERS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 16-24 manuscript received 11 May 77, after completion 9 Nov 77

POBEREZHSKIY, YE. S.

[Abstract] An examination is made of the problems involved in designing a shortwave receiver which uses digital methods of signal processing. Methods of realizing digital multichannel reception complexes are considered, and techniques for reducing the number of quantization levels are examined. It is shown that an analog-digital converter must be used in the shortwave digital receiver for error fixation caused by the finiteness of the gating time. Figures 4; references 12: 8 Russian, 4 Western.

CZECHOSLOVAKIA

UDC 621.315.592.002.2:66.065.5

MOLECULAR EPITAXY--A POTENTIALLY SUPERIOR METHOD FOR THE PRODUCTION OF SEMI-CONDUCTOR COMPONENTS

Prague SLABOPROUDY OBZOR in Czech Vol 39 No 3, Mar 78 pp 93-100

MALINA, VACLAV, Institute of Radiotechnology and Electronics, Czechoslovak Academy of Sciences, Prague

[Abstract] A new method for production of semiconductor components consisting of complicated layered structures is molecular epitaxy. Semiconductors have the composition $A^{III}B^V$ and consist of GaAs, GaP, $GaAs_{1-x}P_x$ and $Al_xGa_{1-x}As$ and similar compounds. The epitaxial method is based on the growth of monocrystalline layers out of gaseous or liquid phases. The preparation is conducted in a very high vacuum of 10^{-8} to 10^{-9} Pa. The semiconductor metal is vaporized at a very rapid rate. Si is used most frequently as an activity donor. Sn, Mg and Ge were also used successfully. The greatest advantage of the epitaxial method is that the thickness of the deposited layer can be controlled with very high accuracy. It is the only method by which a "superlattice" can be prepared. This is a complex heterostructure with a great number of extremely thin layers, the thickness of which may be controlled with an accuracy of 0.5 nm. This method is suitable for the manufacture of the greatest variety of semiconductor parts. Formation of the epitaxial layer can be controlled not only as far as the thickness but also as far as the area is concerned. Molecular epitaxy is also used in the study of the properties of solids. Apart from compounds of the $A^{III}B^V$ type, it is also possible to prepare compounds of the $A^{II}B^{VI}$ and $A^{IV}B^{VI}$ types. It is to be expected that further applications of the molecular epitaxy method will be developed. Figures 10; references 40 (Western).

EXPERIMENTAL INVESTIGATION OF DISTRIBUTED DETECTOR MODELS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 113-115
manuscript received 23 Aug 76; after revision 11 Feb 77

YEGOROV, YE. A., KABANOV, D. A. and POPOV, A. A.

[Abstract] Network models of a distributed semiconductor diode are used to study experimentally mode conversions in a distributed detector in the traveling and standing wave modes. The use of network models of semiconductor structures makes it possible to circumvent difficulties involved in the fabrication and metrics of such structures. The model of a traveling-wave detector was made in the form of an artificial line with semiconductor diodes used as the leakage elements. A model using 60 sections had a single section inductance of 1.77 microhenries and in this case its characteristic impedance was 54 ohms. Up to 10 MHz, the line satisfactorily simulated a system with distributed parameters. A similar nonlinear line with 50 elements was used as the matched load, the bias voltage to all diodes of both lines was supplied through a decoupling network. A network model consisting of 104 sections with diodes and an inductance of 3.5 microhenries was used to simulate a standing-wave detector. Oscilloscope traces are shown for the traveling wave in the first model at a carrier frequency of 450 KHz and a modulation frequency of 1 KHz, and also for the no-load oscillations in the second model, where seven wavelengths were contained in the line at a frequency of 29 MHz. A comparison of graphs of the detection characteristics of the models shows that the standing wave detector has a voltage transmission factor 1.5-2 times greater than the traveling-wave detector; the standing wave detector also has better filtering of the high frequency components of the signal being converted. The bias voltage has little influence on the detector characteristics. The simulated effects were experimentally confirmed in the microwave range using hybrid models in the form of striplines. Figures 4; references 2 (Russian).

USSR

UDC 621.382.2.029.64.001.5

EFFECT OF THE INERTIA OF INTERVALLEY REDISTRIBUTION OF ELECTRONS IN GaAs
ON THE MEASUREMENTS OF THE FUNCTIONS $V(E)$ BY THE MICROWAVE METHOD

Moscow RADIOTEKHNIKA I ELECTRONIKA in Russian No 4, 1978 pp 878-879 manuscript received 7 Jul 76

ARKUSHA, YU. V. and PROKHOROV, E. D.

[Abstract] A study was made in order to discover the theoretical dependences of the threshold velocity, the threshold field and ODP_{max} in the frequency range f , and their dependence on the intensity of the constant electric field E_0 . The Boltzmann kinetic equation was solved by averaging with respect to the concentration, pulse and energy in order to find the dynamic dependences $V(E)$ of GaAs at various frequencies during the microwave period. The measured function $V(E_1)$ at various frequencies and for different E_0 was reproduced by the known procedure with respect to the dynamic functions $V[E(t)]$. The results of these calculations are plotted on graphs showing $V(E)$ at frequencies of 10, 25, 35, 50 and 75 gigahertz for $E_0 = 50$ to 400 volts/cm. For measurements at frequencies above about 10 gigahertz it is necessary to correct the reproduced function $V(E)$ by the results obtained. Figures 2; references 7: 4 Russian, 1 Western, 1 Japanese.

USSR

UDC 621.382.31

REFINED EQUIVALENT NOISE CIRCUIT OF A PLANAR TRANSISTOR

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 5, May 78 pp 96-98 manuscript received 14 Apr 77

LEONT'YEV, G. YE. and PALENSKIS, V. P.

[Abstract] An equivalent noise circuit is proposed for a planar transistor with consideration of three main components of the base current: 1) The current I_{br} caused by recombination of minority carriers in the space-charge region of the emitter junction close to the emergence of the junction on the surface; 2) The current I_{bp} caused by recombination in the passive base region; and 3) The current I_{ba} caused by recombination in the active base region. The following formula is given for the noise factor based on this circuit:

$$F' = 1 + \frac{r_b}{R_g} + \frac{r_e}{2R_g} + \frac{q(I_{br} + I_{bp})R_g}{2kT} + \frac{qI_{ba}(R_g + r_b)^2}{2kTR_g},$$

where r_b is the ohmic resistance of the base, R_g is the resistance of the signal source, r_e is the resistance of the emitter junction, q is the charge on an electron, k is Boltzmann's constant and T is the absolute temperature. In many cases the last term in this formula can be omitted in the region of weak and moderate emitter currents. By using this formula, the composition of the base current can be determined from noise measurements. Figures 3; references 6: 3 Russian, 3 Western.

POLAND

UDC 621.389

METHODS OF AIR-TIGHT SEALING OF POWER SEMICONDUCTOR DEVICES

Warsaw ELEKTRONIKA in Polish Vol 19 No 2, 1978 pp 63-64

TESNY, WOJCIECH, LAMINA Electronic Plant, Piaseczno

[Abstract] Semiconductor devices are very sensitive to atmospheric conditions. For example, the exposure of p-n, p-n-p-n or other junctions to 0.005 percent of atmospheric water vapor may already affect electrical characteristics of semiconductor devices. The methods are discussed of the efficient air-tight sealing of these devices depending on conditions of their operation. The high-frequency and cold welding methods are described and the conditions for proper realization of these methods are stated. Construction of electrodes, their materials, permissible temperatures, and procedures of welding are also presented. Figures 2; tables 1; references 5: 4 Polish, 1 Russian.

POLAND

UDC 621.389

VAPORIZERS IN THIN-FILM EVAPORATION TECHNIQUES

Warsaw ELEKTRONIKA in Polish Vol 18 No 12, 1977 pp 478-480

GREGORCZYK, WOJCIECH, Industrial Institute of Electronics

[Abstract] A review is presented of the following vaporizers used in thermal thin-film evaporation: plane sources, flat stripline sources, point sources, cylindric sources, thin linear sources, ring sources, and disk sources. With a direct deposition on a flat base, none of these sources makes it possible to obtain uniform layers all the way over the base surface. Factors causing distortion of the emission characteristics of these vaporizers, as compared with the emission characteristics of ideal vaporizers, are discussed. Figures 4; references 34: 4 Polish, 29 Western, 1 Russian.

USSR

UDC 519.87

CONCERNING THE PROBLEM OF OBJECT RECOGNITION UNDER GENERALIZED SIGNAL SIMULATION CONDITIONS AS SOLVED BY GAME THEORY METHODS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 5, May 78 pp 54-56 manuscript received 17 Aug 77

NESTERUK, V. F.

[Abstract] This short communication is the text of a paper delivered to the Twenty-Third All-Union Science Session Dedicated to Radio Day, May 1977 in the information theory section. The author considers the problem of object recognition under conditions where there are no objects in the observation zone. Accounting for such a situation leads to the possibility of signal simulation not only by sending false signals, but also by "silence" (generalized simulation). In this formulation, three situations may be realized in the observation zone: 1) an object is present; 2) a simulator is present; 3) no objects are present. These situations make up a complete group of events with additive probability of unity. The observation system sends a probe signal into the observation zone in order to ascertain the situation and recognize the object. Methods of game theory are used to solve the problem in terms of the strategies available to the observation system and to the simulator at each move of a four-move game. The optimum strategies of the observation system are calculated, and the values of the game--indices of recognition quality--are determined for all possible values of the parameters that enter into the problem. The author thanks N. N. Porfir'yeva for assisting with the work. Figures 2; references 5 (Russian).

USSR

UDC 621.372

THE EXCITATION OF A CONE WITH ARBITRARILY DISTRIBUTED EXTERNAL CURRENTS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 10-15 manuscript received 28 Jun 76; after revision 18 Feb 77

PETROV, B. M. and BALABUKHA, N. P.

[Abstract] The problem of exciting an infinite cone has previously only been studied for special cases where the radiation sources are point sources or are specified as current frames coaxial with the cone. The general case is solved here for an ideally conducting, infinite cone in free space; the electrical and magnetic fields are expanded in terms of the vector eigenfunctions of the problem. The result is also expressed in more compact form

using Debye potentials. The specific case of a cone excited with a meridional electrical dipole is then analyzed. The second special case considered is the cone excited by an annular slot of specified width at a set distance from the vertex of the cone, with a set distribution of the current densities in the aperture of the slot. The solutions for this case are also shown graphically. The results allow the analysis of the special cases of the excitation of a metal cone and can also be used directly in solving problems relating to the electromagnetic excitation of a finite cone. Figures 1; references 7: 5 Russian, 2 Western.

USSR

UDC 621.372.825.4

ELECTRODYNAMIC THEORY OF A DIELECTRIC PROBE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 16-23
manuscript received 13 Jul 76

NAYDENKO, V. I.

[Abstract] An electrodynamic theory for dielectric probe measurements in interactive systems is developed. The basis for the theory is the representation of the generation of the perturbed field as the result of the field diffraction at the probe. A coaxial configuration of the system and the probe is analyzed. It is assumed that azimuthally homogeneous transverse magnetic fields exist in the interaction space of the system. This latter assumption is approximately or precisely justified for many practical systems. Expressions in terms of zero and first order Bessel functions of the first kind are derived for the magnetic and electrical components of the field in the interaction space. Similar equations are derived for the field scattered by the dielectric probe. In the general case, the system field is represented by the sum of the spatial harmonics, and the probe is assumed to be homogeneous and the spatial harmonics to be orthogonal over the length of the resonance section. The resulting expressions reduce the methodological error and expand the capabilities of using the method to make measurements with both thick probes and those having a high permittivity. The error in determining the coupling resistance is evaluated; the calculation of one value of the coupling resistance using the formulas and tables of Bessel functions on the "Ros'" keyboard calculator takes 2 to 3 minutes. In the case of a large body of experimental data, programs written for the BESM-4 and MIR-1 computers can be used. Figures 4; references 5 (Russian).

ELECTRICAL ENGINEERING
Electrical Engineering Equipment And Machinery

USSR

UDC 538.552.2.001.24

CALCULATING THE SHIELDING EFFECTIVENESS OF ANALYTICAL SHELLS ENCLOSING A
LOW-FREQUENCY DIPOLE ELECTROMAGNETIC FIELD SOURCE

Moscow ELEKTRICHESTVO in Russian No 5, May 78 pp 60-64 manuscript received
27 Jan 77

APOLLONSKIY, S. M., candidate in technical sciences, Leningrad

[Abstract] Shielding effectiveness is calculated for analytical shells $N(x_2, x_3)$, i.e., those which coincide with the complete coordinate surface of one of the orthogonal curvilinear coordinate systems x_1, x_2, x_3 . The low-frequency electromagnetic field source enclosed by the shell is a dipole arbitrarily oriented in space uniquely determined by three time-variable components of the dipole moment and the coordinates of the center of the dipole. The expressions for shielding effectiveness are derived in a quasi-steady state approximation. Curves are plotted for the shielding effectiveness of a sphere and a cylinder as a function of the radius. Theoretical and experimental data show satisfactory agreement. Figures 3; references 11: 10 Russian, 1 Western.

USSR

UDC 621.3.048

APPROXIMATE CALCULATION OF TRANSIENT PROCESSES IN A SOLENOID-SHIELD SYSTEM

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 115-120

IKRAMOV, RYSTAM ZIYAYEVICH, candidate in technical sciences, and RAZAKOV, ABDUMADZHID--, senior scientific worker

[Abstract] Solenoids with shields are widely used in many electrical and electronic devices. The transient processes in these systems involve a gradual penetration of the wall of the shield by the magnetic field created by the solenoid. In analyzing these transient processes, the authors do not limit themselves to calculation of field intensities, but also include calculation of electrodynamic forces acting on the shield and the solenoid. The combined application of the method of integral transforms and the Bubnov-Galerkin method allows the production of simple, yet precise solutions to the equation for the electromagnetic field of the solenoid-shield system. This method is capable of calculating the transient processes in the solenoid-shield system with various shapes of solenoid current pulse, and with the shield located both inside and outside of the solenoid. Figures 3; tables 1; references 6 (Russian).

USSR

UDC 621.311.4

SELECTING OPTIMUM RATIOS OF ELECTRODE DIMENSIONS IN HERMETICALLY SEALED DISTRIBUTION DEVICES

Minsk IZV. VUZ: ENERGETIKA in Russian No 5, May 78 pp 21-27 manuscript received 10 Mar 77

ALEKSANDROV, G. N., doctor in technical sciences, professor

[Abstract] An investigation is made of optimum ratios of dimensions in coaxial cylindrical insulation systems with gas insulation. It is shown that the regions of optimum ratios of inner and outer electrodes which correspond to discharge voltages near the maximum are fairly wide, both for cylindrical electrodes (R/r from 3 to 5) and for spherical electrodes (R/r from 2 to 3). If the discharge voltage is taken as only 5-10 percent less than the maximum, the ratio of R/r can be increased by a factor of 1.5-2 times the mathematical optimum. This considerably increases the insulation spacing and relaxes conditions for operation of solid insulation. The paper was presented by the Department of Electrical Apparatus, Leningrad "Order of Lenin" Polytechnical Institute imeni M. I. Kalinin. Figures 5; references 3 (Russian).

USSR

UDC 621.316.53.019.3

A SIMPLIFIED METHOD OF CALCULATING THE RELIABILITY OF THYRISTOR COMMUTATING DEVICES

Minsk IZV. VUZ: ENERGETIKA in Russian No 5, May 78 pp 121-123 manuscript received 31 Jan 77

AFANAS'YEV, A. I.

[Abstract] It is shown that in thyristor commutating equipment with series redundancy in each parallel branch, the probabilistic processes that take place in each branch can be treated independently of the other branches. Thus the problem of reliability calculation of the commutating device can be simplified by reduction to determination of the no-failure probability of a single branch and application of the theorem of multiplication of probabilities. This considerably reduces the number and complexity of the differential equations to be solved. The technique is demonstrated by calculating the reliability of a circuit made up of four parallel branches with two reserve thyristors in each branch. The paper was presented by the Department of Electrical Machines and Apparatus, Zaporozh'ye Machine Building Institute imeni V. Ya. Chubar'. Figures 2; references 4 (Russian).

COMPLEX MATHEMATICAL MODEL OF A MULTIPLE-ARM DIFFERENTIAL CURRENT PROTECTOR WITH AN RNT-585 RELAY, AND DIGITAL COMPUTER REALIZATION OF THIS MODEL

Minsk IZV. VUZ: ENERGETIKA No 3, Mar 78 pp 19-24 manuscript received 19 Jul 76

SOP'YANIK, V. KH., candidate in technical sciences

[Abstract] A complex mathematical model is proposed for evaluating the behavior of a differential current protector with RNT-585 relays. The proposed model includes a mathematical description of the current circuits of the multiple-arm differential protector in the three-phase modification with consideration of the nonlinearity of the magnetization characteristics of the current transformers, and a mathematical description of the three saturable current transformers and the RT-40 electromagnetic actuating relays. A flow chart of a digital computer program is given for calculating transient processes in this protector. The model is realized on the Minsk-22 and Minsk-32 computers in Inzhener autocode, and on the YeS-1020 in basic FORTRAN. The differential equations are solved by an average integral method with extrapolation of nonintegrable variables. The confidence of the model was checked by comparing experimental oscillograms with the corresponding digital computer calculations. The discrepancy did not exceed 10 percent. The proposed complex mathematical model can be used to study the influence that the aperiodic component of the short circuit current, secondary loads, nonmagnetic gap in the magnetic circuits of the current transformers and residual inductances in the current transformers have on the processes that take place in the current transformers, the current protection circuits, the saturable current transformer and the RT-40 actuating relays for symmetric and asymmetric short circuits in and out of the protection. The paper was presented by a Seminar of the Power System Laboratory, Belorussian Affiliate of the Institute of Power Engineering imeni G. M. Krzhizhanskiy. Figures 3; references 3 (Russian).

ELECTROMECHANICAL MULTISTABLE DEVICES

Novocherkassk IZV. VUZ: ELEKTROMEKHANIKA in Russian No 2, Feb 78 pp 111-114
manuscript received 12 Jun 75; after completion 29 Jun 76

ABDUKAYUMOV, ABDURASHID, candidate in technical sciences, Dotsent Tashkent Polytechnical Institute; DUB, YAROSLAV TEOFILOVICH, candidate in technical sciences, senior scientific worker, Physico-Mechanical Institute, UkrSSR Academy of Sciences; POGRIBHOY, VLADIMIR ALEKSANDROVICH, candidate in technical sciences, senior scientific worker, Physico-Mechanical Institute, UkrSSR Academy of Sciences; and RAKOV, MIKHAIL ARKAD'YEVICH, dr in technical sciences, Senior Scientific Worker, Physico-Mechanical Institute, UkrSSR Academy of Sciences

[Abstract] Electromechanical multistable elements are closed dynamic systems which include electromechanical elements and nonlinear quadrupoles with multiple-peak input-output characteristics. An analysis is presented of such devices, e.g., a unit containing a matched asynchronous motor and phase shifter. Methods of control of the devices are analyzed and experimentally tested, indicating that they can achieve significantly higher speeds than other devices such as stepping electric motors. Figures 4; references 6 (Russian).

EAST GERMANY; SYRIAN ARAB REPUBLIC

ESTABLISHMENT OF A HIGH-VOLTAGE LABORATORY AT THE FACULTY OF MECHANICAL AND ELECTRICAL ENGINEERING, DAMASCUS UNIVERSITY, SYRIAN ARAB REPUBLIC

East Berlin ELEKTRIE in German Vol 32 No 3, 1978 pp 124-127

HAUSCHILD, WOLFGANG, dr of engineering sciences, Senior scientific assistant, Department of High-Voltage Engineering, Electrical Engineering Section, Dresden Technical University (former guest lecturer at the Faculty of Mechanical and Electrical Engineering, Damascus University); and FAHD, IHSAN, dr of engineering, Dean pro tem of the Faculty of Mechanical and Electrical Engineering, Lecturer on High-Voltage Engineering, Damascus University

[Abstract] The laboratory is built on three levels. It contains large laboratories for high-voltage tests (a large laboratory with a floor area of 32 m by 20 m for testing devices which have insulation voltages between 123 and 420 kV, and a small laboratory with a floor area of 20 m by 10 m for special tests; both are 20 m high) and 13 small laboratories (one for studies and measurements at pulse voltages of up to 200 kV, one for part-discharge measurements, one for dielectric measurements, one for breakdown tests in solid-state bodies, one for testing insulator oils, one for studies and measurements under a.c. voltages of up to 150 kV, one for studies on compressed-gas insulating systems at up to 200 kV, one for long-term tests on solid-state bodies, one for low-voltage models of high-voltage testing systems, one for field studies of electrolytic tanks, and three yet unassigned). There is expansion room (approximately 750 square meters) for the future. The laboratory also has the required auxiliary facilities such as a mechanical workshop, an electronic workshop, a combined workshop for students, storage facilities, filing area, switching units, auxiliary-power systems, and oil-heating system. There are facilities for student training practice. On the upper levels there is an auditorium for 100 people, an auditorium for 50 people, a seminar room, a library, offices for the scientific and administrative staff, and a large student workroom. The article describes some special features of the facility such as grounding, safety devices, lighting systems, floors, transport systems, and installed equipment (1000 and 2400 kV a.c. and pulse voltage test system, d.c. voltage test system, various special testing systems and bench tools such as oscillographs). Construction started in the spring of 1976, and is presently in an advanced stage. Figures 5.

USSR

UDC 537.525.8

GLOW DISCHARGE WITH A SYSTEM OF HOLLOW-TYPE CATHODES

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 5, 78 pp 766-767 manuscript received 24 Aug 77

VOLKOV, N. V., DOBREN'KOV, V. I., INZHEVATOVA, L. A. and TROFIMOV, O. V., Kyubyshev Construction Engineering Institute

[Abstract] As shown in the literature, there is a significant difference, with respect to both outside diameter and electrical characteristics, between glow discharges with plane and hollow-type cathodes. These differences are still more significant if in the discharge there is not one but several identical hollow-type cathodes. The present brief communication compares a glow discharge with a plane cathode and a similar discharge regime which includes a system of hollow-type cathodes of equivalent geometry. Methods for assuring identity of conditions for both discharges are described. Graphs of the voltampere conditions of both types of discharge are presented. It is shown that a glow discharge with the geometry of the discharge gap in question makes it possible to detect another characteristic property of a discharge with a hollow-type cathode. Its investigation in various gases and with other conditions is of specific interest. A glow discharge with such a geometry and such properties can find use in various applied problems, e.g., in such a coding and information conversion, multistage stabilization and automatic voltage control. Figures 2; references 4: 2 Russian, 2 Western.

USSR

UDC 621.385.6:621.376.3

THE EFFECT OF THE RESPONSE TIME LAG OF OSCILLATORS ON THE FREQUENCY FLUCTUATION SPECTRA FOR THE CASE OF NOISE MODULATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 20 No 11, Nov 77 pp 64-70 manuscript received 12 Aug 76; after revision 25 Oct 76

GOMOZOV, V. I.

[Abstract] Wideband oscillators are used in the microwave range in order to generate a noise modulated FM signal. With a rapid change in the modulating voltage, the signal settling time depends on the response lag of the oscillator. The microwave oscillator is represented by an equivalent circuit consisting of an instantaneously responding element which drives an element with a time lag. It is assumed that the static frequency modulation characteristic of the oscillator is linear and that parasitic AM is neglected. The characteristics of the equivalent circuit are determined for a number of

microwave oscillators: a triode oscillator using long lines; a reflex klystron with a wideband resonator; a backward-wave tube with an interdigital interaction system; a wideband mitron; a carcinotron; a carmatron and a Gunn diode with a waveguide oscillator. The results permit the assessment of the steady state characteristics of the modulating noise voltage and the time constant of the frequency settling time needed in order to assure set steady state characteristics for the spectra of signals with frequency noise modulation. Figures 6; tables 1; references 10 (Russian).

USSR

UDC 538.56

ABSORPTION OF MICROWAVES IN SANDY AND CLAY SOILS

Gor'kiy IZV. VUZ: RADIOFIZIKA in Russian Vol 21 No 5, 78 pp 768-769 manuscript received 16 May 77

MOVCHAN, S. P. and STARCHENKO, N. A., Khar'kov Road Transport Institute

[Abstract] Information concerning the magnitude of the electrical parameters of soils of various compositions and the dependence of their electrical properties on moisture and frequency is necessary for solution of a number of national economic problems. In the present brief communication, for determination of the attenuation factor with different soil moistures, a method was selected for absorption of microwave power in an operating model which was arranged in the free space between transmitting and receiving horn-type antennas. Measurements were made in the wave band $\Delta\lambda = 0.8 \pm 3.2$ cm, which assured maximum sensitivity. The principal problem of the experimental investigations consisted in determination of the dependence of the attenuating factor of microwave power on the moisture (in percents) of sand, loam and clay. The results of measurements of the attenuation factor in the designated ranges of moisture are presented in graphical form. Figures 1; references 4: 3 Russian, 1 Western.

YUGOSLAVIA

UDC 621.317.73.087.6

USE OF AN AUTOMATIC SYSTEM TO DETERMINE THE RELIABILITY OF CAPACITORS

Ljubljana ELEKTROTEHNICKI VESNIK in Serbo-Croatian No 4, 1977 pp 251-255
manuscript received 19 Jul 77

HUDOKLIN, ALENKA, mag. fiz.; and KAVCIC, PAVEL, dipl. ing., Ljubljana

[Abstract] A method is described for testing capacitors under various thermal and electrical conditions in order to determine their reliability. Mass testing of 2,000 capacitors in the temperature range of 20°--160°C and under a direct current of 0-500 V is possible using the system, which combines domestic components with components produced by General Radio Corporation. Instrumentation can be connected to a printer. The device for attaching capacitors to the tester was fabricated in the laboratory. The control mechanism permits either automatic or manual operation. Specific functions and alterations to the system are described. The system is shown to be flexible and versatile. Figures 7; references 3 (Serbo-Croatian).

YUGOSLAVIA

UDC 621.319.4

OPERATING PROBLEMS OF CAPACITOR BATTERIES

Ljubljana ELEKTROTEHNICKI VESNIK No 4, 1977 pp 223-231 manuscript received 20 Jul 77

MAJDANDZIC, FRANJO, graduate engineer, EDRO "Elektrokrajina," Banja Luka

[Abstract] In opening and closing circuits which use capacitor batteries, extreme overloads may occur which threaten damage to the entire circuit. The present paper discusses protective measures in order to minimize such problems when using unseparable capacitor batteries. Circuitry and formulas are presented and described for connecting and disconnecting capacitor batteries and for suppressing arc as the current reaches zero, as well as disconnecting by breaking the circuit and with renewed arc. Connections of separable capacitor batteries into the system, harmonics, and precise methods and locations for connecting capacitor batteries are discussed. The importance of appropriate cable connections between the batteries and switches is stressed. Built-in safety fuses in the capacitor elements are suggested at several circuit locations, and other features of the circuitry presented are described. Domestic switches of several types are recommended. Formulas, Figures 11; references 9: 7 Serbo-Croatian; 1 German, 1 Russian.

POLAND

UDC 621.791.3

A METHOD FOR DETECTION OF DEFECTIVELY SOLDERED JOINTS

Warsaw ELEKTRONIKA in Polish Vol 18 No 9, 1977 pp 343-346

DRAPELLA, ANTONI, WIERZBA, HENRYK, and WROCZYSNKI, PIOTR, Institute of Electronic Technology, Gdansk Polytechnic

[Abstract] Faultily soldered joints constitute a considerable percentage of defects in serially produced electronic equipment. The structure of a soldered joint is considered and a criterion for its faultiness is formulated. To test joints for defectiveness, a method of thermal shock, by spraying with liquid nitrogen, is proposed and discussed in detail. The method does not affect correctly soldered joints, it is fast and can be used advantageously in serial production. It is also clean and safe, with no hazard to workers' health. Figures 7; tables 1; references 5: 4 Western, 1 Russian.

POLAND

UDC 655.34

X-RAY LITHOGRAPHY

Warsaw ELEKTRONIKA in Polish Vol 19 No 2, 1978 pp 60-62

PRZYLUSKI, JAN, MENDYK, JANUSZ, and CONDER, KAZIMIERZ; Institute of General Chemistry and Inorganic Technology, Warsaw Polytechnic

[Abstract] The method of x-ray lithography and the prospects for its application in industrial practice are discussed. The importance of x-ray lithography masks suited for this process is stressed. Essential difficulties of centering which arise in multilevel x-ray lithography are emphasized. Examples of some x-ray resists are given. Figures 5; tables 1; references 14: 2 Polish, 12 Western.

OPTIMIZING THE COMPOSITION OF POTTING COMPOUNDS FOR HERMETICALLY SEALING MODULAR COMPONENTS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1978 pp 39-40

GOTRA, Z. YU., candidate in technical sciences, KURYLO, M. S., candidate in technical sciences, and TKHIR, I. G., engineer

[Abstract] An approach is proposed to mathematical design of experiments on optimizing the composition of potting compounds for hermetically sealing the modular components in analog circuits. This approach involves selection of the most important properties characterizing the compound, and then studying these factors as a function of composition and preparation of the compound. Dielectric properties are disregarded. The gelatination time necessary for the given potting technique is predetermined, and the composition is then optimized with respect to viscosity, heat conduction and volumetric shrinkage. The amount of hardener that determines the necessary gelatination time is known on the first stage, and the content of resin can be excluded as a factor by determining the content of all components in parts by weight reduced to 100 parts by weight of resin. This reduces the factors of composition and preparation to three: plasticizer content, filler content and hardening temperature. The proposed approach was used to optimize the composition of potting compound based on ED-20 epoxy resin, polyethylene polyamine, pigment titanium dioxide and dibutyl phthalate. The results gave the following composition (in parts by weight): ED-20--100, polyethylene polyamine--9.2, titanium dioxide--45 and dibutyl phthalate--25. Hardening is at 65°C for ten hours. This compound has the following properties: viscosity--8.5 N·s/m², shrinkage--1.45 percent, coefficient of heat conductivity--0.415 W/m·deg, tensile strength 19.62 N/m², resistivity--8·10¹⁴ Ω·cm, loss tangent--0.03. Tables 1; references 1 (Russian).

POLAND

UDC 621.391

TECHNICAL, ECONOMIC AND OPERATIONAL ASPECTS OF MODULARIZATION OF ELECTRONIC CONSUMER GOODS

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish Vol 51 No 2, 1978 pp 39-42

URICH, RUDOLF, Research and Development Center of Electronic Consumer Goods

[Abstract] The nature of a technological process known as modularization is examined. It is shown that in point of fact it consists of a comprehensive approach and a solution to design, technological and marketing problems. The literature on modularization is reviewed and the expediency of its application in Poland is discussed from the viewpoint of the present situation in domestic industry, consumer electronics, and servicing. References 7: 1 Polish, 6 Western.

HUNGARY

THOUGHTS OF THE PRESENT AND FUTURE OF THE ELECTRONIC INDUSTRY OF HUNGARY

Budapest FINOMMECHANIKA MIROTECHNIKA in Hungarian Vol 17 No 3, Mar 78 pp 89-96

TOFALVI, GYULA, dr, Deputy Chairman, MHE [Hungarian Communications Engineering Association]

[Abstract] This article is the text of the author's lecture delivered at the 15-16 September 1977 conference of the Parts and Base Materials Section of the MHE, held in Szekesfehervar. Emphasis was on ways to increase productivity. The following practicable approaches were discussed: modification of the industry's product structure; increased designing and manufacturing cooperation; industry wide unification and standardization of production; improved manufacturing facilities; upgrading the educational and training level of the staff; improvements in the industrial organizational system; and better working attitudes. In 1975, the domestic demand for electronic parts was $5 \cdot 10^9$ forints' worth; $2.3 \cdot 10^9$ forint's worth of this was covered from domestic production. Two development concepts were proposed for the 1980-1990 period. They assume that the parts-manufacturing capacity will grow in proportion to the total electronic manufacturing capacity, and that 60-70 percent of the parts needs will be met from domestic production (the remaining 30-40 percent will be met from import offset by export). The two concepts differ in that one covers all electronic parts needed in the country and the other covers only the needs of the domestic electronics industry. Figures 3.

USSR

UDC 551.508.9.(088.8)

A LIGHTNING FLASH COUNTER

Minsk IZV. VUZ: ENERGETIKA in Russian No 5, May 78 pp 119-120 manuscript received 7 Jul 77

DUL'ZON, A. A., candidate in technical sciences, docent, and POTAPKIN, V., engineer.

[Abstract] A simple and reliable lightning flash counter is proposed in which an antenna feeds electromagnetic lightning signals to a receiver with output connected to a ranging kipp oscillator. If the signal amplitude exceeds the operating threshold, the kipp oscillator goes to a temporary stable state and sends an enabling signal to one of the inputs of a coincidence gate. The other input receives the sound signal of the thunder. The radius of action of the counter can be varied by changing the delay time of the kipp oscillator. Thunder signals that pass through the coincidence gate go to a thunder kipp oscillator. If the signal amplitude exceeds the operating threshold, the kipp oscillator is triggered and goes to a temporary stable state. The delay time of the thunder kipp oscillator is set so that the thunder for a single lightning flash is not counted more than once. The counter records each operation of the thunder kipp oscillator. The paper was presented by a scientific seminar, Scientific Research Institute of High Voltages Affiliated with the Tomsk "Order of the October Revolution" and "Order of the Red Banner of Labor" Polytechnical Institute imeni S. M. Kirov. Figures 2; references 6: 3 Russian, 3 Western.

USSR

UDC 62-526:62-19

SERVICE LIFE OF ELECTRIC ACTUATING MECHANISMS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1978 p 49

ZAYTSEV, L. M., engineer, KAMCHATKIN, A. P., engineer, and STOMENSKIY, S. N., candidate in technical sciences

[Abstract] It is proposed that minimum cost per month of operation in the period between repairs be used as the optimality criterion for service life of electric actuating mechanisms. A table is given summarizing statistical data on the duration of cycles between repairs and expenditures on repairs over a period of 12 years for 134 electric actuating mechanisms used in the automation systems of central Heat and Electric Power Stations [TETs]. Calculations and analysis show that changes in cost and overall expenditures on overhead and maintenance conform to an exponential law. The following relation is proposed for determining the average operating expenses $\gamma(t)$ in the i -th period:

$$\gamma(t)_1 = 1/t[C_0(1 - e^{-at}) + C_1(e^{\mu t} - 1)],$$

where t is operating time in years, a and μ are parameters of the laws of variation in the initial cost of the mechanisms and overhead expenses, C_0 is cost, C_1 are expenditures on operation and upkeep of the mechanism in the first calculated interval. Requirements for actuating elements and operating conditions are discussed. Tables 2; references 3 (Russian).

USSR

UDC 621.311.001

INVESTIGATION OF STATISTICAL MODELS FOR PREDICTING THE INDICES OF DEVELOPMENT OF ELECTRIC NETWORKS

Minsk IZV. VUZ: ENERGETIKA in Russian No 5, May 78 pp 3-8 manuscript received 19 Jan 78

ARZAMASTSEV, D. A., doctor in technical sciences, professor; MOROZOVA, N. S., engineer; and MYZIN, A. L., candidate in technical sciences

[Abstract] Various forms of statistical-economics models are proposed and analyzed for a total length of electric networks and power of transformer substations for voltage stages of 220 and 110 kV. The statistical data are provided by information on seven power systems from 1960 to 1973. The indices considered in constructing the models include area of the territory, population (municipal and rural), number of cities with population of 15,000 and 100,000, installed power of electric plants, including hydroelectric, fossil-fuel and State regional power plants, and also the largest generator size, production and consumption of electric energy and the maximum electric load. The proposed factor-autoregression and factor-regression models of growth in electric power network characteristics are fairly accurate. The paper was presented by the Department of Electrical Stations, Network and Systems, Ural "Order of the Red Banner of Labor" Polytechnical Institute imeni S. M. Kirov. Figures 2; references 3 (Russian).

HUNGARY

UDC 621.315.2.027.3.017.72:621.315.616:678.742.2

POLYETHYLENE-INSULATED, WATER-FILLED AND WATER-COOLED HIGH-VOLTAGE CABLES

Budapest VILLAMOSSAG in Hungarian Vol 26 No 5, May 78 pp 129-134

KARDOS, GYORGY, dr, graduate mechanical engineer, candidate of engineering sciences, institute head, Hungarian Cable Works, member of MEE [Hungarian Association of Electrical Engineering]; GYULASI, FERENC, dr, graduate electrical engineer, deputy institute head, Hungarian Cable Works, member of MEE; and MAZURA, JANOS, graduate electrical engineer, head of the main engineering department, Hungarian Cable Works, member of MEE

[Abstract] Laboratory experiments are described with respect to the following polyethylene-insulated, water-filled, and water-cooled high-voltage cables, which were developed for ultimate production at Hungarian Cable Works: (1) 12 mm thick cable for 20-35 kV; (2) 6.5 mm thick cable for 20-35 kV; (3) 15 mm thick cable for 120 kV; (4) and 15 mm thick cable for 120 kV (a strand and end unit for cables where the end was prepared by heat-shrinking plastic tubing). The tests described include lifetime determination, voltage resistance, water effects, and reliability. Some trial experiments under actual service conditions showed repeated breakthroughs. The main purpose of the experiments was to establish whether this failure is caused by improper extrusion methods in the manufacture of the polyethylene sheath or by the presence of the water. No final conclusions were reached. The tests are continuing and the results will be used to prepare improved cables for 120 kV transmission for service trials. The end unit withstood 70 kV. Figures 10; references 7 (Western).

USSR

UDC 621.315.175

EXPERIENCE IN HANDLING ICE PROBLEMS IN THE DISTRIBUTION NETWORKS OF THE
ORENBURGENERGO SYSTEM

Minsk IZV. VUZ: ENERGETIKA in Russian No 3, Mar 78 pp 126-130 manuscript
received 13 Dec 76

BANNIKOV, YU. I., candidate in technical sciences, docent; ANESH, I. P.,
engineer; and PINCHUK, L. A., engineer

[Abstract] The present paper is concerned with an overview of the measures used for ice control on power transmission lines of 6-10 kV and higher in the Orenburgenergo system. These measures include the following: 1. An "ice alarm" signal in network enterprises intensifies observation of the process of ice formation on the wires of overhead lines. 2. Provisions are made for melting ice by short-circuit current or load current on lines of all voltages. 3. Ice is mechanically removed (broken) from cables and wires. 4. Incomplete phasing is used in power transmission line operation. 5. Local and network standby circuits are being constructed. Losses in the Orenburgenergo system because of replacement of line sections and towers have been severe. The measures now being used are inadequate for the required reliability of high-voltage transmission lines. It is urged that this problem be given prompt attention. The paper was presented by the Department of Agricultural Power Supply, Chelyabinsk Institute of Mechanization and Electrification of Agriculture. Tables 3; references 1 (Russian).

USSR

UDC 621.315.211.2.001.5

CHECKING THE STATE OF INSULATION OF POWER CABLES DURING TECHNOLOGICAL
PROCESSING

Minsk IZV. VUZ: ENERGETIKA in Russian No 3, Mar 78 pp 30-35 manuscript re-
ceived 6 Dec 77

IYERUSALIMOV, M. YE., doctor in technical sciences, professor, and KOVRIGIN,
L. A., engineer, Kiev "Order of Lenin" Polytechnical Institute imeni the
Fiftieth Anniversary of the Great October Socialist Revolution, Perm' Poly-
technical Institute

[Abstract] Studies were made on the process of drying of 10 kV power cables. Laboratory experiments were conducted in order to determine how absorption current depends on the moisture content of K-120 cable paper at measurement times from 0.01 to 10 s. The experiments demonstrated the feasibility of

using absorption current to check the process of drying power cables. It was shown that absorption current and the rate of fall of absorption current are equivalent parameters in checking the moisture content of paper if the relation between absorption current and time is a straight line in logarithmic coordinates. The moisture content of paper cable insulation was experimentally determined under production conditions during technological processing on the basis of absorption current measurement. It was shown that the present schedules for drying power cables can be reduced if the process is controlled with respect to absorption current. Figures 3; tables 1; references 3: 2 Russian, 1 Western.

USSR

UDC 621.316.542

DETERMINATION OF DESIGN RATINGS FOR SELECTION OF ELECTRIC EQUIPMENT IN NETWORKS FOR 330 kV AND ABOVE

Minsk IZV. VUZ: ENERGETIKA in Russian No 3, Mar 78 pp 7-12 manuscript received 13 Dec 77

NAYASHKOVA, YE. F., candidate in technical sciences; and SPIRIDONOV, N. N., engineer

[Abstract] The authors consider the particulars of the transient process of short circuiting and determination of the design ratings for selection of electric equipment in networks of 330 kV and above. An approximate formula is derived for calculating the short circuit current at any instant, disregarding the distributed transverse capacitance of the electric transmission lines and the inductance of shunting reactors. Formulas are also derived for calculating the impact current accompanying short circuits on lines with longitudinal compensators and for determining the heat pulse of the short circuit current on such lines. The heat pulse formula gives a somewhat overstated value because higher harmonics are disregarded. The paper was presented by the Department of Electrical Stations, Moscow "Order of Lenin" Power Engineering Institute. Figures 3; references 2 (Russian).

USSR

UDC 621.316.575.001.5

INVESTIGATIONS OF THE TRIPPING CAPACITY OF CIRCUIT BREAKERS AT TRIPPING POWERS OF UP TO 20 MILLION KVA

Minsk IZV. VUZ: ENERGETIKA in Russian No 5, May 78 pp 28-34 manuscript received 31 Mar 77

AKODIS, M. M., doctor in technical sciences, professor; KONSTANTINOV, A. G., engineer; and KORZUN, P. A., candidate in technical sciences, docent.

[Abstract] A report is made on studies of the switching capacity of circuit breakers with tripping power in excess of 20 million KVA at a voltage of up to 300 kV. An installation for testing such switches has been in operation at the Ural Polytechnical Institute for the past 8 years. An analysis of test results shows that the tripping capacity of updated series VVN breakers for 110, 150 and 220 kV should be determined on the basis of tests of the complete poles of these switches, while the VV series for 330 and 500 kV should be evaluated on the basis of half-pole tests. The tripping capacity of series VNV circuit breakers should be established on the basis of tests of at least one complete double-break module. The paper was presented by the Department of High-Voltage Transformers, Ural "Order of the Red Banner of Labor" Polytechnical Institute imeni S. M. Kirov. Figures 2; tables 2; references 6: 5 Russian, 1 Western.

EAST GERMANY

ARITHMETIC FUNCTION UNITS IN THE ANALOG INFORMATION PROCESSING OF THYRISTOR-SUPPLIED DIRECT-CURRENT DRIVES

East Berlin ELEKTRIE in German Vol 32 No 3, 1978 pp 133-136

KRAUSE, JOACHIM, dr of engineering, group leader, Research and Development Section, Electrical Projects and System Construction State Enterprise, East Berlin

[Abstract] The arithmetic function units briefly described in this article perform the following operations: simulation of functions, multiplication, calculation of roots, calculation of powers, division, integration, addition, and subtraction. In addition, they solve problems like determination and integration of non-linear required values, calculation of auxiliary rated parameters, adaptation to changes in parameters within the control system, protection of systems by current limitation not dependent on circulating frequency, and indirect determination of parameters of control systems (measuring setups and the like). Typical circuits and power supply units are described and illustrated with block diagrams. Modules for many of the functions have already been described and are available; they are designed specifically for the special technological requirements of thyristor operation. Figures 9; references 11 (German).

EAST GERMANY

ECONOMIC PROBLEMS IN THE USE OF ABSORPTION CIRCUITS

East Berlin ELEKTRIE in German Vol 32 No 3, 1978 pp 128-130, 127

PFEILER, VOLKMAR, dr of engineering sciences, Professor, director; and BERNET, DIETER, dr of engineering, senior scientific assistant, Electrical Engineering Section, Technical University, Ilmenau

[Abstract] The investment costs of an absorption circuit comprise the cost of first acquisition for the capacitors, chokes, and other parts; and the costs of the installation. In addition there are annual operating costs, made up of the depreciation and expenses for maintenance and repair. By comparing the economic costs of the absorption circuit with the economic advantages realized by the circuit we calculate the amortization period which is a measure of the economic advantage. The total loss costs are made up of the shortened lifetime of the system and the transmission losses caused by the upper harmonics and the non-compensated groundwave current. These calculations are illustrated by an example involving a real industrial supply

system. The calculations, described in detail, indicate that the investment costs of absorption circuits are amortized within a 2 to 5.5 year period, and are affected by the load status. The trends in power electronics are such that the advantages of the absorption circuits will become increasingly pronounced. The State-Enterprise Association for Automation and Electric Power Systems must ensure the supply of standardized absorption-circuit coils and promulgate unified design guidelines to promote this trend. Figures 9; tables 2; references (on p 127)4: 3 German, 1 Russian.

CSO: 1860

- END -